ABSTRACT

Title of Dissertation:	ESSAYS ON CREDIT RISK IN EMERGING MARKETS
	Di Wang, Doctor of Philosophy, 2020
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This dissertation presents two studies on credit risk in emerging markets.

In Chapter 1, I examine how the credit risks of corporations in nine emerging markets (EMs) affect those of their sovereigns. I construct a novel data set that combines daily corporate news and daily credit default swap (CDS) rates on EMs' sovereign and corporate bonds. A high-frequency event-study analysis shows that a 10% surprise increase in corporate CDS rates leads to about a 3.0% rise in sovereign CDS rates within a one-day event window. Being an SOE adds another 3.5% rise in sovereign CDS rates. Being a corporation operating in a government-dependent sector adds a 3.0% rise in sovereign CDS rates. Being a large corporation adds a 2.6% to 3.8% rise in sovereign CDS rates. Stress in domestic banking sectors also contributes to additional spillovers. Among all channels, being an SOE has the most prominent effect. An extreme value analysis shows that extreme changes in sovereign CDS are more likely when CDS rates of its SOEs, government-dependent, or large corporations

experience extreme changes, even after controlling for common shocks that affect both corporations and sovereigns.

In Chapter 2, I study the drivers of sovereign credit default swap (CDS) rates in a group of seventeen emerging markets over July 2004-December 2017, covering the 2007-2009 Global Financial Crisis. I find that a single principal component accounts for 34, 60, 48 percent of the variation in sovereign CDS rates in the pre-crisis, crisis, and post-crisis period, respectively. Moreover, panel estimates show that: first, local factors, including stock market returns and exchange rates against the U.S. dollar, are always critical determinants of EMs' sovereign CDS rates; second, stepping into the crisis period, U.S. stock market return and bond market volatility start to affect EMs' sovereign CDS rates significantly; third, after the crisis ends, U.S. stock market return continues its influence, but a broader set of global factors become to play an essential role in driving EMs' sovereign CDS rates.

ESSAYS ON CREDIT RISK IN EMERGING MARKETS

by

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Dedication

To Nan, Hong, and Xiaojun.

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1.1 Introduction

Sovereign credit risk has always been a concern for emerging markets (EMs). There have been 17 sovereign defaults by 12 EMs since 1999.[1] Although researchers have documented that sovereign credit risk impacts the real sector of the economy, few have studied whether credit risk in the real sector could be a source of sovereign credit risk. According to the Bank for International Settlements, total credit lent to non-financial corporations as a percentage of GDP in EMs substantially increased from 2007 to 2016. The aggregate EM corporate debt-to-GDP ratio has grown by 46 percentage points in that period, compared to 4.9 percentage points in advanced economies. Aggregate EM corporate debt reached 106 percent of their GDP by 2016. Table 1.1 lists some selected EMs' sovereign credit rating actions related to corporate sector conditions, taken recently by Moody's, one of the major credit rating agencies. The rationale behind these rating actions indicates several possible channels through which corporate credit risk could spill over to the corresponding sovereign credit risk.

[1] The list of sovereign defaults is provided in the Appendix as Table A.1.

Table 1.1: Selected EMs' Sovereign Credit Rating Actions by Moody's (2011-2016)

Date	Country	Rating Action	Rationale Related to Corporate Sector
11/20/2013	Malaysia	Moody's changes outlook for Malaysia's A3 rating to positive from stable.	We expect limited volatility from these items, including dividends, royalty payments, and taxes sourced from the national oil and gas company, Petroliam Nasional Bhd.
1/16/2015	Russia	Moody's downgrades Russia's government bond rating to Baa3; on review for further downgrade.	Review for future downgrade will examine the extent to which the potential need to provide financial support of the corporate and banking sectors may erode the sovereign's financial strength...and/or increase the use of government guarantees.
8/11/2015	Brazil	Moody's downgrades Brazil's rating to Baa3 from Baa2; outlook changed to stable.	Low capacity utilization, low business confidence, and Petrobras-related developments will negatively affect investment prospects this year and next. Political dynamics are damaging: the lack of political consensus on fiscal reforms have been exacerbated by the events surrounding the Lava Jato investigation and Petrobras-related corruption scandals.
2/24/2016	Brazil	Moody's downgrades Brazil's issuer and bond ratings to Ba2 with a negative outlook.	The downgrade to Ba2 is intended to capture that ongoing deterioration, while the negative outlook contemplates the risks of further deterioration to Brazil's credit profile emanating from macroeconomic shocks...or the need to support government-related entities. Reduced uncertainty about the magnitude of contingent liabilities migrating to the sovereign balance sheet, most likely from Petrobras, could also lead Moody's to stabilize the outlook.
3/2/2016	China	Moody's changes outlook on China's Aa3 government bond rating to negative from stable; affirms Aa3 rating.	The government's balance sheet is exposed to contingent liabilities through regional and local governments, policy banks, and SOEs. The ongoing increase in leverage across the economy and financial system and the stress in the SOE sector imply a rising probability that some of the contingent liabilities will crystallize on the government's balance sheet.
3/31/2016	Mexico	Moody's changes Mexico's outlook to negative from stable; affirms A3 rating.	One key driver of today's rating action is contingent liabilities in the form of possible government support to PEMEX, given liquidity pressures at the state-owned oil producer, could further undermine the fiscal consolidation process.

The first possible channel is that a deterioration in state-owned enterprises (SOEs) or government-dependent sectors has the potential to trigger the use of government guarantees and thus become a driver of sovereign credit downgrading.[2] When SOEs or government-dependent companies have difficulty paying back debt and the sovereign assumes the contingent liabilities of SOEs, the costs of the bailout hurt the government's fiscal position and increase its sovereign credit risk.[3] The number of contingent liabilities that may crystallize on governments' balance sheets could be sizable. According to IMF (2015), the share of EMs' corporate debt issued by SOEs increased from nearly zero in 2010 Q1 to more than 40 percent in 2015 Q3.

The second possible channel is that certain corporations are so large that their failure would be a disaster to their government (for example, by causing a substantial decline in tax revenue) or aggregate economic activity. Therefore, government support is needed in times of difficulty, i.e., these firms are "too big to fail." It is also possible that large corporations are systemically important and may have more spillovers to the sovereign, which does not necessarily depend on implicit bailout guarantees for these corporations. Credit risk to systemically important corporations could spill over to the sovereign simply because adverse shocks to large corporations hurt the overall economy and tax revenue.

The third possible channel is through the banking sector. Greater corporate leverage in EMs can make firms less able to withstand adverse shocks to income or

[2] I later measure the government dependence of different sectors by using the method of Pellegrino and Zingales (2017), who capture the degree of government involvement in an industry's media coverage.
[3] SOEs are usually more politically connected than non-SOEs, and Faccio, Masulis, and McConnell (2006) document that politically connected firms are significantly more likely to be bailed out in a crisis than otherwise similar non-connected firms.

asset values. An increased possibility of corporate default could quickly spill over to the banking sector because corporate debt accounts for a significant share of emerging market banks' assets (IMF, 2015). Elevated losses in the banking sector may, in turn, weaken the sovereign's financial strength and induce government bailouts of banks, whose cost increases sovereign credit risk.

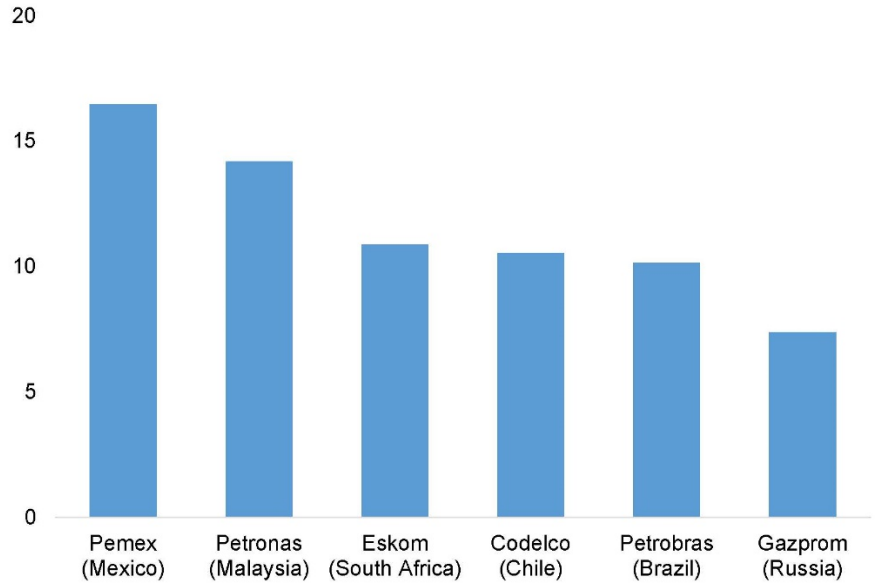
In this study, I undertake a systematic examination of corporate credit risk's impact on sovereign credit risk through these three transmission channels. I analyze a set of 9 EMs: Brazil, Chile, China, Malaysia, Mexico, Philippines, Russia, South Africa, and Thailand. This group of countries is particularly interesting because the mechanisms studied in this paper may already be at work in these countries. Most of them have large quasi-sovereign companies that are not only highly indebted, as shown in Figure 1.1, but are also among the most significant contributors to the GDP growth of their home country. As energy prices turned unfavorable in recent years, these companies found it hard to pay back debt with decreased profits, and the probability of government bailouts and banking sector failures rose.

To measure corporate and sovereign credit risk, I use daily credit default swap (CDS) rates, a market-based risk-neutral measure of the probability of default.[4] The higher the CDS rate, the greater the market's perceived probability of default. A CDS

[4] A CDS is a financial derivative in which the seller of the swap agrees to insure the buyer against the possibility that the issuer (sovereign or firm) defaults on its debt. Once a third party, the International Swaps and Derivatives Association (ISDA), declares a credit event, an auction occurs to determine the price of the defaulted debt. The CDS seller then pays the buyer the difference between the face and the auction value of the debt. An important advantage of using CDS data (rather than bond data) is that the CDS market is typically more liquid than the corresponding bond market, resulting in more accurate estimates of credit spreads and returns.

rate of 300 basis points, for example, implies it would cost $300,000 per year to insure $10 million worth of debt over a particular time frame, typically five years.

Figure 1.1: Selected Quasi-Sovereign Company's Debt as Percentage of GDP
Year 2016



Source: Worldscope and IMF.

There is a critical identification issue in estimating the impact of changes in corporate CDS rates on changes in sovereign CDS rates, and this paper aims to mitigate the issue. A positive correlation between corporate and sovereign CDS rates may simply demonstrate the substantial pass-through running from sovereign to corporate credit risk, which has been well documented in the literature (as discussed in Section 1.2). To show empirically that the direction of causality is indeed from corporate to sovereign risk, I use a high-frequency event-study analysis as in Gürkaynak, Sack, and Swanson (2005) to confirm the presence of causality running from corporate to sovereign credit risk. Section 1.4 also uses an extreme value analysis as in Forbes (2013) to further illustrate the extent of contagion between corporations and sovereigns.

For the high-frequency event-study analysis, I construct a new data set that captures changes in sovereign credit risk in a 24-hour window containing news releases relevant to that country's corporations' credit status, using daily data from 1/1/2014 to 12/29/2016. The use of intra-day data allows better isolation of the response of sovereign risk to news on corporate risk. The results show that a 10% increase in corporate CDS rates leads to about a 3.0% rise in sovereign CDS rates within a one-day event window. Being an SOE adds another 3.5% rise in sovereign CDS rates. Being a corporation operating in a government-dependent sector adds a further 3.0% rise in sovereign CDS rates. Being a large corporation adds another 2.6% to 3.8% rise in sovereign CDS rates. These estimates are statistically significant. Stress in the domestic banking sector, measured by elevated bank CDS rates and banking sector news releases, also contributes to credit risk spillovers. The results of the regression with all channels included show that being an SOE has the most prominent effect among all channels.

Additionally, I use an extreme value analysis to assess the contagion effects. I identify the days during the sample period when either the corporation or sovereign has an extreme-positive or extreme-negative change in CDS rates, defined as a change in the top or bottom 5 or 1 percentile of the distribution of changes in CDS rates. Extreme changes in corporate CDS rates are significantly and positively correlated with the probability of an extreme change in its sovereign CDS rate on the same day. That probability is increased by a factor of up to 16.7 compared to the case of no extreme changes in the corporate CDS rate. Being an SOE or a large corporation contributes to greater contagion into sovereign credit risk. Although the extreme value analysis is not

able to identify the direction of causality, it still can shed light on the extent of contagion between corporate and sovereign CDS rates.

The paper has several policy implications. First, because the sovereign-SOE nexus can spread the SOEs' corporate risk to the sovereign and have a systemic impact, policymakers should closely monitor SOEs' financial status, especially highly leveraged SOEs in strategically important sectors. Second, SOEs may overborrow from the perspective of the social planner. There is evidence that higher sovereign credit risk passes down to more expensive financing for other firms in that country (see Section 1.2). Therefore, there is a pecuniary externality associated with SOE borrowing. When SOEs make borrowing decisions, they do not consider how their actions could affect other firms' financing costs through higher sovereign credit risk. The real borrowing cost for SOEs should include their spillover effect on other firms. Moreover, large SOEs with close government relationships are usually able to get subsidized credit from state-owned banks. They know that governments are likely to bail them out if they default, creating a moral hazard problem. All of these factors contribute to SOEs' overborrowing, and policymakers may want to privatize SOEs to improve social welfare. Similarly, policymakers should also review regulations on large and interconnected corporations that are "too big to fail." They should work to mitigate the moral hazard problem, e.g., by preventing them from deliberately taking positions that are high-risk, high-return and from leveraging such risks based on implicit guarantees.

The remainder of the chapter is organized as follows. Section 1.2 presents a brief review of the literature. Section 1.3 provides empirical evidence from the high-

frequency event study. Section 1.4 reports and discusses the main findings of the extreme value analysis. Section 1.5 concludes.

1.2 Related Literature

This research is related to several strands of the literature. Many studies have documented a strong link between sovereign and private sector interest rates, both in emerging economies and, more recently, in European countries. Government crises affect aggregate outcomes through firms' borrowing, creating a financial channel; see Neumeyer and Perri (2005) and Uribe and Yue (2006) for discussion of sovereign crises and business cycles in emerging markets, and Corsetti, Kuester, Meier, and Müller (2013) for discussion of the implications of sovereign risk pass-through for fiscal multipliers. The pass-through of sovereign risk to the private sector has been studied both theoretically and empirically. Bocola (2016) proposes a quantitative model for studying the transmission of sovereign risk to the borrowing costs of firms and real economic activity through financial intermediation. Acharya, Drechsler, and Schnabl (2014) model a loop between sovereign and bank credit risk, in which government bailouts of the financial sector increase sovereign credit risk, which in turn weakens the financial sector by eroding the value of its government guarantees and bond holdings. Arellano, Bai, and Bocola (2019) use a sovereign debt model calibrated to Italian firm- and bank-level data to measure the effects of an increase in sovereign risk on the private sector. They find that heightened sovereign risk was responsible for one-third of the observed output decline during the 2011-2012 crisis in Italy.

On the empirical side, Baskaya and Kalemli-Özcan (2016) investigate the effect of sovereign risk on credit provision, using the August 1999 earthquake as an

exogenous shock to Turkey's sovereign default risk. Bedendo and Colla (2015) document that an increase in sovereign credit spreads in the euro area is associated with a significant increase in corporate spreads, and hence firms' borrowing costs. Augustin, Boustanifar, Breckenfelder, and Schnitzler (2018) explore the first Greek bailout to examine the transmission of sovereign risk to corporate credit risk.

The existing literature on sovereign-corporate linkages focuses on causality running from sovereign to corporate risk, while my paper explores causality running in the other direction. Combining these two sides implies a loop between sovereign and corporate credit risk. Increased sovereign credit risk weakens the financial sector and increases the borrowing costs of firms. A distressed corporate sector induces government bailouts, whose costs, in turn, increase sovereign credit risk.

This paper contributes to the understanding of the determinants of sovereign credit risk. Longstaff, Pan, Pedersen, and Singleton (2011) find that 64 percent of sovereign credit risk can be linked to global factors, using a dataset of sovereign CDS contracts of 26 countries. Aizenman, Hutchison, and Jinjarak (2013) show that fiscal space and other macroeconomic factors are statistically and economically significant determinants of sovereign risk for the Eurozone Periphery countries. Dieckmann and Plank (2012) document that the state of a country's financial system and also the state of the world financial system have strong explanatory power for the behavior of sovereign CDS spreads. Du and Schreger (2017) show that a higher reliance on external foreign currency corporate financing is associated with a higher default risk on sovereign debt denominated in local currency. This paper is the first to empirically

show that corporate credit risk is also a determinant of sovereign credit risk using a high-frequency event-study analysis.

This paper also adds to the emerging literature on how microeconomic shocks may transmit to fluctuations at the macro level. This literature characterizes the law of motion for the firm size distribution for any *finite* number of firms, so it does not rely on the traditional "continuum of firms" assumption. Gabaix (2011)'s seminal work introduces the "Granular Hypothesis," which states that whenever the firm size distribution is fat-tailed (compared to a normal distribution), idiosyncratic shocks average out at a slow enough rate that they can translate into aggregate fluctuations. Acemoglu, Ozdaglar, and Tahbaz-Salehi (2017) argue that macroeconomic tail risks can have their origins in idiosyncratic microeconomic shocks to disaggregated sectors. Carvalho and Grassi (2019) show that the prominence of a small number of firms leaves open the possibility that aggregate outcomes may be affected by the dynamics of large firms. They develop a quantitative theory of aggregate fluctuations caused by firm-level disturbances alone. Kwak (2019) shows that rising leverage in large European firms can explain about a third of rising sovereign spreads during the 2020-2012 European debt crisis. My paper complements this literature by focusing on the transmission of *credit risk* from the micro to the macro level for large firms in *emerging markets*.

Finally, this paper is related to the literature on the impact of SOEs and the real cost of government bailouts. Lin, Cai, and Li (1998) argues that an economy with SOEs is subject to allocative inefficiency because the industrial structure deviates from the pattern dictated by comparative advantage. Faccio, Masulis, and McConnell (2006)

analyze the likelihood of government bailouts of 450 politically connected firms from 35 countries and find that politically connected firms are significantly more likely to be bailed out than similar non-connected firms. Jeske, Krueger, and Mitman (2011) evaluate the macroeconomic and distributional effects of government bailout guarantees in the US mortgage market and find that eliminating such a guarantee could substantially increase aggregate welfare. This paper establishes another source of inefficiency resulting from SOEs and government-dependent firms, namely their excessive borrowing and consequently higher borrowing costs for other firms due to elevated sovereign credit risk.

1.3 High-frequency Event-study Analysis: The Effects of Changes in Corporate Risk on Sovereign Risk

In this section, I investigate the spillover effects of changes in corporate risk on sovereign risk using a high-frequency event-study analysis and explore the channels of these spillovers. I construct a new data set that captures changes in sovereign credit risk in a one-day window bracketing news releases relevant to its corporations' credit status from 1/1/2014 to 12/29/2016. The use of daily data allows me to isolate better the response of sovereign risk to news releases on corporate risk. I identify idiosyncratic corporate shocks that are exogenous with respect to sovereign risks. According to the estimates, news on corporate risk has a significant impact on sovereign risk, as measured by changes in rates in the CDS market. Moreover, changes in credit risk of SOEs, corporations in government-dependent sectors, and corporations with a large scale in terms of total assets, total liabilities, or corporate income tax payment have an especially large impact on sovereign risk relative to their counterparts.

1.3.1 Methodology

I examine how sovereign CDS rates respond to changes in corporate CDS rates within a one-day window after corporate news releases, using the following regression:

$$\Delta Log(sovereign\ CDS)_{jt} = \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{ijt} + \theta \Delta Log(X_{jt}) + \epsilon_{ijt} \quad \text{Equation 1}$$

where *i*, *j*, and *t* denote corporate, sovereign, and time on a daily basis, respectively.

$\Delta Log(corporate\ CDS)$ denotes the daily log change in the corporate CDS rates on the date of the news release, and $\Delta Log(sovereign\ CDS)$ denotes the daily log change in the sovereign CDS rates for the country where the corporation's headquarters resides. $\Delta Log(X_{jt})$ is the daily log change in a list of country-level control variables, which may drive corporate and sovereign credit risk at the same time. It includes (1) the daily log change in the close price of that sovereign's major stock index; (2) the daily log change in the relevant commodity price associated with each corporation; and (3) the daily log change in that country's exchange rate against the US dollar.[5] [6]

α_j and δ_t denote country and day fixed effects, respectively. The day fixed effects help to capture changes in macroeconomic fundamentals that have a common effect on both corporate and sovereign credit risk. ϵ_{ijt} is a stochastic error term that captures the effects of other factors that influence the sovereign CDS rates.

[5] The stock indices adopted for each country are the Ibovespa Brasil Sao Paulo Stock Exchange Index for Brazil; Santiago Stock Exchange General Index for Chile; Shanghai Stock Exchange Composite Index for China; FTSE Bursa Malaysia Kuala Lumpur Composite Index for Malaysia; Índice de Precios y Cotizaciones (IPC) for Mexico; Philippines Stock Exchange PSEi Index for the Philippines; Moscow Exchange MICEX-RTS PJSC for Russia; FTSE/JSE Africa All Share Index for South Africa; and Stock Exchange of Thailand SET Index for Thailand.

[6] Gazprom is associated with natural gas; Codelco with copper; CAP, Companhia Siderúrgica Nacional, Gerdau, Severstal, and Usiminas with steel; ALROSA with diamonds; AngloGold Ashanti with gold; and Vale SA with iron. Other corporates are associated with crude oil.

I use a high-frequency event-study analysis to estimate Equation 1. One generally cannot estimate such a model using monthly or quarterly data due to simultaneous equations and omitted variables bias. In particular, the change in corporate CDS rates could be a response to a change in sovereign risk that took place earlier in the month or quarter, due to the direct effects of sovereign risk on corporate borrowing costs. Alternatively, both corporate and sovereign risk could be responding to crucial macroeconomic news (captured by ϵ_{ijt}) that was released earlier in the period, such as US monetary policy shocks. In either case, the classical regression assumption that ϵ_{ijt} is orthogonal to $\Delta Log(corporate\ CDS)_{ijt}$ would be violated.

These problems can be mitigated by using higher-frequency data to focus on the correlation between sovereign and corporate CDS rates during periods around the release of corporate news. I estimate Equation 1 using only daily changes that happen within a narrow window of time after the news releases. By setting the event-study window to 24 hours, it becomes less likely that any other significant events took place within this narrow window that might have influenced both sovereign and corporate risk, thereby reducing omitted variables and simultaneity bias. A similar methodology has been widely used in finance, for example, in the study of the post-earnings-announcement drift phenomenon, which is the impact of firms' earnings announcements on their stock returns over the next 30 or 60 trading days.[7]

[7] See Bernard and Thomas (1989) as an example.

1.3.2 Data and Summary Statistics

The focus of my study is the impact of corporate credit risk on sovereign risk in emerging markets. To measure credit risk, I collect publicly-traded CDS data from the Markit database. Compared to other sources of CDS data such as Bloomberg and Thomas Reuters Datastream, Markit has several advantages. First, it has the most comprehensive coverage, providing *end-of-day* (i.e., 4pm EDT) CDS single name composites on approximately 2,600 entities. On a daily basis, Markit collects more than a million CDS quotes contributed by more than 30 major market participants. The quotes are subject to a curve-based cleaning process that removes outliers and stale observations. Markit then computes a daily composite spread only if it has two or more contributors. Second, Markit is one of the most widely employed CDS databases in finance and economics literature. Papers that employ this dataset include Acharya and Johnson (2007), Jorion and Zhang (2007), Zhang, Zhou, and Zhu (2009), and Hébert and Schreger (2017). I focus on the available universe of corporate and sovereign 5-year CDS markets since the 5-year maturity is most liquid in the CDS market. These CDS are all denominated in US dollars, eliminating confounding pricing effects from exchange rates in CDS rates.

I apply several filters to the CDS data to mitigate bias from missing or stale data, following the existing literature (Bedendo and Colla, 2015; Berndt and Obreja, 2010; Schneider, Sögner, and Veža, 2010). First, I exclude CDS for which the longest series of consecutive missing rates are more than two weeks. Second, I exclude CDS for which the percentage of missing data exceeds 15% of the whole period, which amounts to 117 missing rates. Third, I exclude stale observations with zero changes in

either sovereign or corporate CDS rates. Finally, I require every country included in the sample to have a minimum of four companies. I exclude Colombia, Hungary, Indonesia, Poland, and Turkey because of this restriction on CDS transaction sufficiency. I identify 9 EMs that have sufficient publicly-traded CDS data available in the corporate, sovereign, and banking sectors. They are Brazil, Chile, China, Malaysia, Mexico, Philippines, Russia, South Africa, and Thailand.

After CDS data cleaning, I collect news releases concerning credit risk on the corporations in my sample of CDS over the period from 1/1/2014 to 12/29/2016. To avoid "cherry-picking," I search for news releases through Dow Jones' Factiva News Search database, commonly used in event studies. This database covers business news articles from over 8,000 sources, including national and international newspapers, magazines, wire services, websites, and industry (trade) sources. I use corporate names as the identifier and collect their news releases under four categories related to credit risk: corporate actions, financial performance, corporate financial difficulty, and corporate funding. Combining the two data sources, I identify a total of 61 corporations in the 9 EMs mentioned above. For the main analysis, I use a one-day event window. Consider a news release at 2pm EDT on Wednesday, November 9, 2016. The one-day event window, applied to this event, would imply examining the CDS rate change from the close on Tuesday, November 8 to the close on Wednesday, November 9. If the news is released after 4pm EDT (i.e., after the market closes), it would be treated as news released early morning on Wednesday, November 9. I also check the robustness of my results to using a two-day event window.

To screen out corporate shocks that might be correlated with sovereign or aggregate shocks, I exclude event days when there are sovereign credit rating actions or commentaries released from either of the three major credit rating agencies: Standard & Poor's (S&P), Moody's, and Fitch Group. A total of 2,300 observations out of 36,992 are dropped from the sample for this reason. Table A.2 summarizes detailed information on the corporations included in the sample. They operate in 7 sectors defined by Markit: basic materials, consumer goods, consumer services, energy, industrials, telecommunications, and utilities. I match the data on corporate CDS rates to the CDS rates on sovereigns for the countries in which the corporations' headquarters reside. I drop observations with missing corporate or sovereign CDS data.

The final sample consists of 10,201 observations for 61 corporations in 9 EMs. Table 1.2 presents the descriptive statistics for the final sample, broken down by each sovereign. Overall, there are substantial variations in both corporate and sovereign CDS rates within and across countries. Russia and Brazil are the most represented countries, comprising about 36% and 20% of the sample, respectively. Other countries have reasonably large shares in the sample as well.[8]

[8] For comparison, summary statistics for all dates, including dates without major corporate news releases and dates with sovereign risk announcements, are reported in Table A.4 in the Appendix.

Table 1.2: Summary Statistics for High-frequency Event-study Analysis

	Obs.	Mean	SD	Min.	Med.	Max.	Skew.	Kurt.
Whole Sample								
$\Delta Log(corporate\ CDS)$	10201	-0.002	0.042	-1.716	-0.001	0.832	-8.508	348.9
$\Delta Log(sovereign\ CDS)$	10201	0.003	0.032	-0.163	0.003	0.192	0.167	5.831
$\Delta Log(stock\ index)$	9107	0.000	0.018	-0.112	0.000	0.125	-0.053	7.759
$\Delta Log(commodity\ price)$	10201	-0.001	0.030	-0.847	0.000	0.378	-5.873	191.4
$\Delta Log(exchange\ rate)$	9986	0.001	0.012	-0.129	0.000	0.109	0.328	22.15
Brazil								
No. of news per corp.	-	232	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	2089	-0.002	0.054	-0.780	-0.001	0.832	-2.678	110.8
$\Delta Log(sovereign\ CDS)$	2089	0.004	0.032	-0.133	0.004	0.138	0.168	5.366
Chile								
No. of news per corp.	-	69	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	481	0.000	0.024	-0.089	0.000	0.348	6.249	91.78
$\Delta Log(sovereign\ CDS)$	481	0.005	0.032	-0.102	0.005	0.109	0.140	4.508
China								
No. of news per corp.	-	120	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	838	-0.005	0.068	-1.716	-0.000	0.250	-19.25	489.0
$\Delta Log(sovereign\ CDS)$	838	0.005	0.025	-0.079	0.003	0.116	0.512	4.581
Malaysia								
No. of news per corp.	-	113	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	792	-0.002	0.030	-0.091	-0.004	0.155	0.653	5.163
$\Delta Log(sovereign\ CDS)$	792	0.001	0.029	-0.088	0.000	0.162	0.606	5.794
Mexico								
No. of news per corp.	-	151	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	1056	-0.001	0.025	-0.116	-0.002	0.146	0.484	5.679
$\Delta Log(sovereign\ CDS)$	1056	0.003	0.033	-0.112	0.002	0.147	0.175	4.253
Philippines								
No. of news per corp.	-	95	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	378	-0.010	0.073	-0.497	-0.002	0.298	-2.560	20.11
$\Delta Log(sovereign\ CDS)$	378	0.004	0.025	-0.052	0.003	0.096	0.478	3.911
Russia								
No. of news per corp.	-	366	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	3660	-0.002	0.030	-0.462	-0.000	0.353	-0.815	34.99
$\Delta Log(sovereign\ CDS)$	3660	0.001	0.035	-0.163	0.003	0.192	0.078	6.164
South Africa								
No. of news per corp.	-	102	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	510	-0.004	0.037	-0.390	-0.001	0.197	-2.709	34.89
$\Delta Log(sovereign\ CDS)$	510	0.004	0.024	-0.070	0.003	0.092	0.247	3.900
Thailand								
No. of news per corp.	-	79	-	-	-	-	-	-
$\Delta Log(corporate\ CDS)$	397	-0.004	0.029	-0.151	-0.002	0.211	0.209	13.03
$\Delta Log(sovereign\ CDS)$	397	0.002	0.023	-0.073	0.001	0.104	0.644	5.860

Note: CDS data cover dates that have news releases from 1/1/2014 to 12/29/2016. $\Delta Log(corporate\ CDS)$ and $\Delta Log(sovereign\ CDS)$ are the daily log change in corporate CDS rates and sovereign CDS rates, respectively. $\Delta Log(stock\ index)$ is the daily log change in the closing price of a country's major stock index. $\Delta Log(commodity\ price)$ is the daily log change in the relevant commodity

price associated with each corporation. $\Delta Log(exchange\ rate)$ is the daily log change in the country's foreign exchange rate against the US dollar.
Source: CDS data are from Markit. Stock index data are from Bloomberg. Commodity prices and exchange rates are from Thomas Reuters Datastream.

1.3.3 Discussion of Main Results

In Section 1.3.3.1, I present and analyze the estimates of spillovers from corporate to sovereign credit risk. In Section 1.3.3.2, I discuss three possible channels through which corporate credit risk may transmit to sovereign credit risk.

1.3.3.1 Corporate to Sovereign Credit Risk Spillovers

Table 1.3 presents the results from estimating the baseline regression Equation 1. The independent variable is the daily log change in the sovereign CDS rate, and the sample consists of dates when there are news releases concerning corporate credit risk. Column (1) includes only the log change in corporate CDS rates and time fixed effects as independent variables, while column (2) adds country fixed effects. The coefficient on corporate CDS rates has the expected positive sign and is statistically significant. Next, I add changes in stock prices, relevant commodity prices, and exchange rates against the USD. Results in columns (7) and (8) indicate that, on average, a surprise 10% increase in corporate CDS rates due to negative news leads to about a 3.0% increase in sovereign CDS rates, and these estimates are statistically significant. This extent of risk transfer is also economically significant. A one-standard-deviation increase in corporate CDS rates (0.042) corresponds to an increase in sovereign CDS rates of 0.39 standard deviations ((0.297 × 0.042)/0.032 = 0.39, see Table 1.2).

These results provide empirical support to models suggesting that idiosyncratic firm-level shocks can explain part of aggregate fluctuations and provide a micro-

foundation for aggregate shocks (Gabaix, 2011; Acemoglu, Ozdaglar, and Tahbaz-Salehi, 2017; Carvalho and Grassi, 2019). I include day fixed effects in all model specifications to control for any common macroeconomic factors. The comparison of estimations with and without country fixed effects shows that my results are robust against controlling for unobservable and time-invariant country-specific factors. I correct all standard errors for possible heteroskedasticity and auto-correlation by adopting Newey-West variance estimates.[9]

The coefficients of the control variables also have the expected signs and are statistically significant. An increase in stock prices, an indicator of better expectations about future economic activity, lowers sovereign risk. Declining commodity prices push up sovereign risk since they erode the sovereign's tax revenue. Finally, an increased exchange rate (i.e., depreciation against the US dollar) makes paying down sovereign debt denominated in the US dollar considerably more expensive, thus elevating that emerging market's sovereign risk.

[9] Details about the Newey-West standard errors can be found in Newey and West (1987).

Table 1.3: High-frequency Event-study Analysis - Baseline Regression Results

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Log(corporate\ CDS)_{ijt}$	0.335***	0.335***	0.309***	0.307***	0.305***	0.303***	0.298***	0.297***
	(5.54)	(5.58)	(4.95)	(4.97)	(4.95)	(4.97)	(4.93)	(4.95)
$\Delta Log(stock\ index)_{jt}$			-0.533***	-0.542***	-0.520***	-0.529***	-0.505***	-0.513***
			(-16.52)	(-16.96)	(-16.34)	(-16.76)	(-16.54)	(-17.01)
$\Delta Log(commodity\ price)_{jt}$					-0.095***	-0.096***	-0.093***	-0.093***
					(-5.88)	(-5.81)	(-6.13)	(-6.06)
$\Delta Log(exchange\ rate)_{jt}$							0.271***	0.268***
							(7.86)	(7.90)
Country FE	N	Y	N	Y	N	Y	N	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,201	10,201	9,107	9,107	9,107	9,107	9,107	9,107

Note: t statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively

1.3.3.2 Discussion of Risk Transmission Channels

Having established that there indeed exist credit risk spillovers from the corporate sector to sovereigns, I next explore the channels through which such spillovers could take place. I highlight possible mechanisms in this section. First, I investigate the fiscal channel by testing whether the credit risk of corporations with stronger ties to their domestic government affects their sovereign credit risk more. Second, I explore the size channel by testing whether big corporations, in terms of total assets, total liabilities, and corporate income tax payments, affect sovereign credit risk more. Third, I examine the financial channel by testing whether stressed domestic banks transfer additional credit risk to their sovereigns.

The fiscal channel. One channel for how non-financial corporations may transmit credit risk to their sovereigns could be that the sovereigns have such substantial ownership in these corporations that governments implicitly guarantee their debt to prevent them from falling. A distressed SOE sector increases the probability that some of its contingent liabilities will crystallize on the government's balance sheet. The amount of the implicit government guarantee could be sizable: Jin, Wang, and Zhang (2018) exploit the first default by a large SOE, Baoding Tianwei, in China's onshore bond market and find that implicit government guarantees account for at least 1.75% of bond value. Government guarantees in EMs are not uncommon as well. Table A.5 in the Appendix lists some recent examples of government bailouts of SOEs. In addition to the SOEs, corporations that operate in sectors where governments are influential in the purchasing or regulatory process may have close ties to the government and may be eligible for implicit government guarantees as well. Faccio,

Masulis, and McConnell (2006) document that politically connected firms are significantly more likely to be bailed out in a crisis than otherwise similar non-connected firms.

To test these two hypotheses, I construct two dummy variables and interact each with corporate CDS shocks. The first dummy variable is state ownership at the firm level, SOE_i, and is time-invariant throughout my sample period. I would expect that adverse credit shocks to SOEs would increase sovereign credit risk to a larger extent than for non-SOEs. I collect corporations' most recent ultimate state ownership information from their official websites and the Worldscope database (see Table A.2).[10] The pairwise correlations between corporate and sovereign CDS rates among SOEs (defined using 100% ultimate state ownership) is 0.96 while that of non-SOEs is 0.89, suggesting that sovereign credit risk moves more closely with SOE than non-SOE credit risk. Motivated by this finding, I run the following regression:

$$\Delta Log(sovereign\ CDS)_{jt} = \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{ijt} + \gamma \cdot SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt} + \theta \Delta Log(X_{jt}) + \epsilon_{ijt} \quad \text{Equation 2}$$

where *i*, *j*, and *t* denote corporate, sovereign, and time on a daily basis, respectively.

In this subsection, I focus on estimates of Equation 2 using a cutoff of 100% ultimate state ownership: the SOE_i dummy takes on the value one if the corporation's state entity ultimately holds 100% of this corporation's stock, and zero otherwise. Other

[10] Ultimate ownership is different from direct ownership in that ultimate ownership traces the control chains of related companies. For example, suppose Company A is wholly owned by Company B, and 50% of Company B's stock certificates are directly held by its sovereign entity in its name. Then the direct state ownership of company A is zero, while the ultimate ownership is 50%. Compared to direct state ownership, ultimate state ownership more precisely reflects the government's control over an SOE. My results are robust to using direct state ownership.

cutoffs are used in robustness tests. Ten out of 61 corporations in my sample have 100% ultimate state ownership (see Table A.2). The interaction term $SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$ aims to capture the extra spillover effect from corporate risk to sovereign risk through the government's implicit guarantees.

In addition to the *SOE* dummy at the firm level, I construct a time-invariant "government dependence" variable, varying across both sectors and countries, following Pellegrino and Zingales (2017). The variable measures how much each sector is dependent on government contracts, regulations, and interventions. The story behind this measure is that corporations in more government-dependent sectors are more likely to maintain a close relationship with their government, thus becoming more "politically connected." According to Faccio, Masulis, and McConnell (2006), politically connected firms are significantly more likely to be bailed out in a crisis than otherwise similar non-connected firms. To construct this variable, I count news articles by sector and by country from Factiva, using its industry tags. The sectors of firms in my sample are matched with Factiva's 17 industry tags.[11] The variable "government dependence" is defined, for each sector q in country j, as the ratio of the number of news articles having "Government Contracts" or "Regulation/Government Policy" as their topics, to the total number of news articles for sector q. I consider all news outlets covered by Factiva over the period from 1/1/2014 to 12/29/2016. Table A.6 reports summary statistics for the "government dependence" variable.

[11] Factiva's industry tags are Agriculture, Automotive, Basic Materials/Resources, Business/Consumer Services, Consumer Goods, Energy, Financial Services, Health Care/Life Sciences, Industrial Goods, Leisure/Arts/Hospitality, Media/Entertainment, Real Estate/Construction, Retail/Wholesale, Technology, Telecommunication Services, Transportation/Logistics, and Utilities.

Suppose a sector has a "government dependence" value higher than the 75th percentile of sectors in the sample for that country. In that case, it is considered as "government-dependent," and I create an indicator variable "*GOV*" that equals one for government-dependent sector-country pairs, and zero otherwise. Table A.7 reports the government-dependent sectors for each country. Similar to the regression using the *SOE* dummy, I interact *GOV* with my original corporate CDS variable to investigate if corporations in government-dependent sectors affect their sovereign's credit risk more strongly:

$$\Delta Log(sovereign\ CDS)_{jt} = \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{iqjt} + \zeta \cdot GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt} + \theta \Delta Log(X_{jt}) + \epsilon_{iqjt} \quad \text{Equation 3}$$

where *i*, *q*, *j*, and *t* denote corporate, sector, sovereign, and time on a daily basis, respectively.

The interaction term $GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$ captures the extra spillover effect from corporate risk to sovereign risk through the dependence of government business.

Columns (1) and (2) of Table 1.4 present the results from estimating Equation 2 and Equation 3, including the interactions of corporate risk and indicators of dependence on the government. The results in column (1) support my hypothesis on SOEs, with a statistically significant difference at the 1% level between the impact of SOE and non-SOE corporations on sovereign risk. The coefficient suggests that a 10% increase in non-SOE corporate CDS rates leads to a 2.7% rise in sovereign CDS within a one-day event window while being an SOE adds another 3.5% rise in sovereign CDS

rates. Among publicly traded corporations included in the sample, higher ultimate state ownership contributes to a more significant spillover between corporate and sovereign risk. Results defining SOEs based on direct state ownership are quantitatively very similar.

Meanwhile, the coefficient of the "*GOV*" interaction term is statistically significant as well, as shown in column (2). The results indicate that being in a government-dependent sector, and thus having closer political connections, does contribute more to the spillover effect, causing an additional 3.0% rise in sovereign CDS rates.

The size channel. The second transmission mechanism is that some firms are "too big to fail". Certain corporations are so large that their failure would be a disaster to the government or aggregate economic activity so that the government is likely to support them in periods of difficulty. Corporations benefit from such protective policies not because of their direct relationship with government, like SOEs, but because they are large enough to be systemically important. Their failures may cause a substantial decline in tax revenue or aggregate output, either way leading to higher sovereign credit risk. Additionally, systemically important firms may have more spillovers to the sovereign simply because adverse shocks to large firms hurt the overall economy and tax revenue even if there are never bailouts.

To test this hypothesis, I match corporate CDS data with firm-level annual balance sheet data from Worldscope and construct three firm-level "*SIZE*" dummy variables to measure the relative size of a corporation in the sample: "*ASST*", "*LIAB*", and "*TAX*". "*ASST*" is an indicator set equal to one if a corporation's average total

assets across 2014 to 2016 has a higher than 75th percentile level of total assets among all corporations in that country sample, and zero otherwise. Similarly, "*LIAB*" and "*TAX*" are assigned to one or zero based on a corporation's levels of total liabilities and corporate income tax payments, respectively. I interact these *SIZE* dummies with my original corporate CDS variable to investigate if relatively larger corporations affect their sovereign's credit risk more strongly:

$$\Delta Log(sovereign\ CDS)_{jt} = \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{ijt} \quad \text{Equation 4}$$
$$+\eta \cdot SIZE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$$
$$+\theta \Delta Log(X_{jt}) + \epsilon_{ijt}$$

where *i*, *j*, and *t* denote corporate, sovereign, and time on a daily basis, respectively.

As presented in columns (3) - (5) of Table 1.4, the credit risk of large corporations does significantly impact their sovereign credit risk more than that of smaller corporations. Being a corporation with total assets in the top quartile of its country leads to an additional 3.8% rise in sovereign CDS rates when corporate CDS rates increase by 10%. If I measure a corporation's size by total liabilities or corporate income tax payments, being large (i.e., in the top quartile of its country sample) leads to about an additional 3.5% and 2.6% rise in sovereign CDS rates, respectively. In the robustness tests, I also use the 50th percentiles (median) as the cutoff of a corporation being large or not. The results are no longer significant (see Table 1.8). This comparison indicates that corporations need to be very large to have such an extra spillover effect on their sovereigns.

The financial channel. The third possible risk transmission mechanism is through the banking sector. In countries where banks hold a considerable amount of

local corporate debt, banks could experience stress or even bankruptcy when their corresponding corporate borrowers have difficulty paying back loans. Sovereign credit risk may be elevated because of a stressed banking sector, especially if there are potential bailouts of banks. Therefore, this indirect corporate-bank- sovereign channel could amplify the adverse effects of the direct corporate-sovereign spillover.

To test this hypothesis, I collect the CDS rates on banks headquartered in each sovereign. I identify a total of 53 banks with publicly traded CDS (see Table A.3). I do not have enough information to identify relationships between specific banks and corporations (e.g., taking loans and selling bonds). Therefore, I match the equal-weighted average of CDS for banks headquartered in that sovereign to the CDS rates of corporations headquartered in the same sovereign. I drop observations with missing bank CDS data. Then, I use bank names as the identifier and collect their news releases related to the financial market from the Factiva News Search database. I construct a dummy variable at the country level, *"BANK"*, which takes the value of one if any sample banks in that country have news release on that date, and zero otherwise. I then interact this *BANK* dummy with my bank CDS variable and add the interaction term to the baseline model Equation 1 to investigate if stressed banking sectors amplify the spillovers from corporate to sovereign risk:

$$\Delta Log(sovereign\ CDS)_{jt} = \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{ijt} + \kappa \cdot BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt} + \lambda \cdot \Delta Log(bank\ CDS)_{jt} + \theta \Delta Log(X_{jt}) + \epsilon_{ijt} \quad \text{Equation 5}$$

where *i*, *j*, and *t* denote corporate, sovereign, and time on a daily basis, respectively.

Column (6) of Table 1.4 presents the regression results. The coefficients of the interaction terms are statistically significant with positive signs, suggesting that a stressed banking sector indeed amplifies the spillover effects.

I also construct two country-level measures of financial development and test whether a more developed banking sector in emerging markets can mitigate spillovers to some extent. The first measure, DEP_j, is a proxy for a country's dependence on banks. Following Levine (2002) and Augustin et al. (2018), I construct this measure by taking the ratio of each country's aggregate private sector bank deposits to the country's stock market capitalization. A ratio higher than one suggests that the country's financial system is bank-based. I obtain data from the Financial Structure Database published by the World Bank. The second measure, CRE_j, aims to capture the importance of a country's banking sector to the corporate sector. I use data from the Bank for International Settlements (BIS) and calculate bank credit to the private non-financial sector as a percentage of total credit to the private non-financial sector for each country. I first calculate these two measures at an annual frequency and then average them over 2014 to 2016 for a given country to get a long-run sense of how much businesses in a country rely on banks rather than the market for financing. Table A.8 in the appendix shows their summary statistics.[12] [13]

[12] No data on CRE is available for the Philippines.

[13] According to BIS' definitions, credit covers loans and debt securities; the private non-financial sector includes non-financial corporations (both private-owned and public-owned), households and non-profit institutions serving households as defined in the System of National Accounts 2008. BIS has no data covering only non-financial corporations for emerging markets. The indicators used here are the closest ones I am able to find to approximately capture the exposure of a country's banking sector to the corporate sector.

Table 1.4: High-frequency Event-study Analysis – Risk Transmission Mechanisms

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

	State Own. (firm-level)	Gov. Dep. (sector-level)	Total Assets (firm-level)	Total Liab. (firm-level)	Taxation (firm-level)	Bank Stress (country-level)
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Log(corporate\ CDS)_{ijt}$	0.268***	0.286***	0.198***	0.199***	0.221***	0.293***
	(4.60)	(4.78)	(3.83)	(3.74)	(3.70)	(4.66)
$SOE_i \cdot \Delta Log(corporate\ CDS)_{iqjt}$	0.352***					
	(3.55)					
$GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$		0.297**				
		(2.27)				
$ASST_i \cdot \Delta Log(corporate\ CDS)_{ijt}$			0.376***			
			(6.04)			
$LIAB_i \cdot \Delta Log(corporate\ CDS)_{ijt}$				0.352***		
				(5.28)		
$TAX_i \cdot \Delta Log(corporate\ CDS)_{ijt}$					0.261***	
					(3.23)	
$BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt}$						0.046**
						(2.12)
$\Delta Log(bank\ CDS)_{jt}$						0.094***
						(11.15)
$\Delta Log(stock\ index)_{jt}$	-0.508***	-0.510***	-0.479***	-0.484***	-0.493***	-0.486***
	(-18.06)	(-17.46)	(-20.23)	(-19.81)	(-19.13)	(-16.67)
$\Delta Log(commodity\ price)_{jt}$	-0.088***	-0.092***	-0.084***	-0.080***	-0.090***	-0.090***
	(-6.02)	(-6.08)	(-6.37)	(-5.91)	(-6.28)	(-5.98)
$\Delta Log(exchange\ rate)_{jt}$	0.253***	0.267***	0.242***	0.237***	0.257***	0.255***
	(7.98)	(8.02)	(8.41)	(8.21)	(8.32)	(7.81)
Country FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	9,107	9,107	9,107	9,107	9,107	8,988

Note: Column (1) interacts corporate CDS with SOE, which is a dummy for whether the corporation has 100% ultimate state ownership, and column (2) includes country fixed effects. Column (2) interacts corporate CDS with a dummy variable *GOV*, which takes a value of one if a corporation operates in a sector with a "government dependence" value higher than the 75th percentile of sectors in the country sample, and zero otherwise. Column (3) interacts corporate CDS with *ASST*, a dummy for whether the corporation has total assets higher than the 75th percentile of its country level. Column (4) interacts corporate CDS with *LIAB*, a dummy for whether the corporation has total liabilities higher than the 75th percentile of its country level. Column (5) interacts corporate CDS with *TAX*, a dummy for whether the corporation has total taxation higher than the 75th percentile of its country level. Column (6) interacts bank CDS with a dummy variable *BANK*, which takes a value of one if country *j* on date *t* experiences a news release on any of the banks included in the sample and zero otherwise. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

As I did with the fiscal channel, I interact these two measures with the original corporate CDS variable to investigate the hypothesized mitigating effect of financial development on spillovers. Table A.9 in the appendix shows that the coefficients of the interaction terms are statistically significant with negative signs, suggesting that a larger banking sector compared to financial markets mitigate spillover effects to some extent.

Relative Strength of Three Channels. I run the following regression, which includes all interaction terms for the three channels. The standard beta coefficients are reported so the relative strength of three channels can be directly compared.

$$\begin{aligned}\Delta Log(sovereign\ CDS)_{jt} = {} & \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{ijt} \\ & + \gamma_1 \cdot SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt} \\ & + \gamma_2 \cdot GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt} \\ & + \gamma_3 \cdot SIZE_i \cdot \Delta Log(corporate\ CDS)_{ijt} \\ & + \gamma_4 \cdot BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt} \\ & + \lambda \Delta Log(bank\ CDS)_{jt} + \theta \Delta Log(X_{jt}) + \epsilon_{ijt}\end{aligned} \qquad \text{Equation 6}$$

where *i*, *j*, and *t* denote corporate, sovereign, and time on a daily basis, respectively.

Table 1.5 presents the regression results with standard beta coefficients. Standardized beta coefficients show how many standard-deviation changes in the dependent variable with every change of one standard deviation in an independent variable. They make results comparable across different independent variables.

The results first show that, among three transmission channels, the fiscal channel working through state ownership is the most prominent, indicating that being an SOE is most influential on sovereign credit risk among all firm characteristics. It is consistent with the rationale of credit rating actions against EM sovereign debt by major credit rating agencies (see Table 1.1 for selected examples). Secondly, being a large corporation measured by its total assets and total liabilities also has a significant impact on changes in sovereign CDS rates. A stressed banking sector has a weakly impact on sovereign credit risk. Thirdly, either being in a government-dependent sector or a large corporation measure by income tax payment does not significantly elevate sovereign credit risk; their influence may be absorbed by other firm characteristics.

Table 1.5: Relative Strength of Three Transmission Channels

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

Independent variable	(1)	(2)
$\Delta Log(corporate\ CDS)_{ijt}$	0.210***	0.205***
	(3.22)	(3.19)
$SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.201***	0.203***
	(19.27)	(19.44)
$GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$	0.006	0.006
	(0.19)	(0.19)
$ASST_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.102***	0.099***
	(2.67)	(2.64)
$LIAB_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.134***	0.136***
	(3.72)	(3.77)
$TAX_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.063	0.062
	(1.32)	(1.32)
$BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt}$	0.017	0.019*
	(1.59)	(1.72)
$\Delta Log(bank\ CDS)_{jt}$	0.155***	0.152***
	(11.72)	(11.65)
$\Delta Log(stock\ index)_{jt}$	-0.214***	-0.217***
	(-17.30)	(-17.82)
$\Delta Log(commodity\ price)_{jt}$	-0.060***	-0.058***
	(-5.98)	(-5.70)
$\Delta Log(exchange\ rate)_{jt}$	0.088***	0.083***
	(8.42)	(8.08)
Country FE	N	Y
Time FE	Y	Y
Observations	8,988	8,988

Note: standard beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

1.3.4 Robustness Tests

In this section, I conduct several tests to check the robustness of my results. First, I run regressions with different state ownership, government dependence, and size cutoffs. Second, I run an alternative specification to Equation 1, with a dummy indicating news releases. Third, I run regressions with a two-day event window. Lastly, I run a falsification regression using lagged daily log changes in sovereign CDS rates as the dependent variable. My main results on the spillover effect from corporate to sovereign risk are robust against these specifications.

Different SOE Cutoffs. Besides using 100% ultimate state ownership as the cutoff for defining an SOE, I also try 30%, 50%, and 80% cutoffs to see whether corporations' state ownership needs to be as high as 100% to have an extra spillover effect on sovereign credit risk. Regression results, reported in Table 1.6, show that the credit risk of corporations with more than 80% ultimate state ownership also spills over more to sovereign credit risk than corporations with ultimate state ownership lower than 80%. However, the size of the extra spillover is smaller, compared to the case using 100% ultimate state ownership (0.280 vs. 0.352). Meanwhile, regressions using 30% and 50% cutoffs do not yield significant coefficients of the SOE interaction term, suggesting that lower levels of ultimate state ownership do not lead to the perception of implicit government guarantees and consequent elevated sovereign credit risk.

Table 1.6: Main Regression Results - Different SOE Cutoffs

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

Independent variable	30%	50%	80%	100%
$\Delta Log(corporate\ CDS)_{ijt}$	0.193***	0.259***	0.271***	0.268***
	(6.07)	(6.59)	(4.55)	(4.60)
$SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.217	0.091	0.280***	0.352***
	(1.41)	(0.60)	(3.02)	(3.55)
$\Delta Log(stock\ index)_{jt}$	-0.494***	-0.509***	-0.509***	-0.508***
	(-11.32)	(-14.24)	(-17.96)	(-18.06)
$\Delta Log(commodity\ price)_{jt}$	-0.090***	-0.093***	-0.090***	-0.088***
	(-5.49)	(-5.96)	(-6.06)	(-6.02)
$\Delta Log(exchange\ rate)_{jt}$	0.259***	0.265***	0.256***	0.253***
	(6.39)	(6.92)	(8.06)	(7.98)
Country FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	9,107	9,107	9,107	9,107

Note: columns (1) – (3) interact corporate CDS with SOE_{30}, SOE_{50}, SOE_{80}, which indicate whether the corporation has state ownership strictly higher than 30%, 50%, and 80%, respectively. Column (4) repeats, as a comparison, the baseline results where corporate CDS is interacted with *SOE* using 100% state ownership as the cutoff. T statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Different "Government-Dependent" Sector Cutoff. Besides using the 75th percentile to define "government-dependent" sectors, I also use the 50th percentile (i.e., median) as a cutoff to define the dummy variable *GOV*. GOV_{50} equals one if a corporation operates in a sector with a higher than the *median* level of the "government dependence" variable among all sectors in that country, and zero otherwise. Regression results are reported in Table 1.7. Contrary to the results shown in columns (3) and (4) of Table 1.4, the coefficients on interaction terms are no longer significant. It indicates that a sector's "government dependence" indicator has to reach at least the top quartile among all sectors in a country to be substantial enough to cause extra corporate-sovereign spillovers.

Table 1.7: Main Regression Results - Different "Government Dependence" Cutoffs

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

Independent variable	50th percentile	75th percentile
$\Delta Log(corporate\ CDS)_{iqjt}$	0.283***	0.288***
	(3.96)	(4.68)
$GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$	0.069	0.304**
	(0.78)	(2.15)
$\Delta Log(stock\ index)_{jt}$	-0.511***	-0.508***
	(-17.82)	(-16.92)
$\Delta Log(commodity\ price)_{jt}$	-0.092***	-0.090***
	(-6.11)	(-5.83)
$\Delta Log(exchange\ rate)_{jt}$	0.266***	0.264***
	(8.14)	(7.99)
Country FE	Y	Y
Time FE	Y	Y
Observations	9,107	9,107

Note: columns (1) and (2) interact corporate CDS with a dummy variable *GOV*, which takes a value of one if a corporation operates in a sector that has a "government dependence" value higher than the 50th and 75th percentile of sectors in the country sample, and zero otherwise, respectively. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Different Size Cutoff. Besides using the 75th percentile to define a corporation as large or not, I also use the 50th percentile (i.e., median) as a cutoff. Table 1.8 presents results when I interact corporate CDS with "*ASST*", "*LIAB*", and "*TAX*", which are dummies for whether the corporation has total assets, total liabilities, and corporate income tax payments higher than the 50th percentile of the sample corporations in that country, respectively. Corporations with total assets larger than their country median spill over additional credit risk to their sovereigns. However, corporations with total liabilities or corporate income tax larger than their country's median level do not show an additional spillover effect. The results suggest that corporations' borrowing or contribution to government tax revenue has to reach at least the top quartile to be considered as systemically important to the sovereign.

Table 1.8: Main Regression Results - Different Size Cutoffs

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

	Total Assets		Total Liabilities		Taxation	
	50th percentile	75th percentile	50th percentile	75th percentile	50th percentile	75th percentile
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Log(corporate\ CDS)_{ijt}$	0.112***	0.198***	0.196***	0.199***	0.228***	0.221***
	(3.10)	(3.83)	(6.59)	(3.74)	(4.93)	(3.70)
$ASST_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.413***	0.376***				
	(7.31)	(6.04)				
$LIAB_i \cdot \Delta Log(corporate\ CDS)_{ijt}$			0.157	0.352***		
			(1.47)	(5.28)		
$TAX_i \cdot \Delta Log(corporate\ CDS)_{ijt}$					0.115	0.261***
					(1.04)	(3.23)
$\Delta Log(stock\ index)_{jt}$	-0.460***	-0.479***	-0.506***	-0.484***	-0.511***	-0.493***
	(-19.14)	(-20.23)	(-14.90)	(-19.81)	(-15.85)	(-19.13)
$\Delta Log(commodity\ price)_{jt}$	-0.081***	-0.084***	-0.090***	-0.080***	-0.091***	-0.090***
	(-6.10)	(-6.37)	(-5.60)	(-5.91)	(-5.72)	(-6.28)
$\Delta Log(exchange\ rate)_{jt}$	0.231***	0.242***	0.263***	0.237***	0.267***	0.257***
	(8.11)	(8.41)	(7.09)	(8.21)	(7.55)	(8.32)
Country FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	9,107	9,107	9,107	9,107	9,107	9,107

Note: columns (1) and (2) interact corporate CDS with *ASST*, which is a dummy for whether the corporation has total assets higher than 50th and 75th percentile of its country level, respectively; columns (3) - (4) and columns (5) – (6) do similar interactions with *LIAB* and *TAX*, respectively. T statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Specification with News Dummy. Besides using a high-frequency event-study which only includes dates with corporate news releases, I also conduct an alternative specification to Equation 1. I create an indicator variable NEWS that equals one on a date with a news release and zero otherwise, and interact it with the change of corporate CDS rates:

$$\Delta Log(sovereign\ CDS)_{jt} = \alpha_j + \delta_t + \beta \Delta Log(corporate\ CDS)_{ijt} \quad \text{Equation 7}$$
$$+\eta \cdot NEWS_t \cdot \Delta Log(corporate\ CDS)_{ijt}$$
$$+\theta \Delta Log(X_{jt}) + \epsilon_{ijt}$$

where *i*, *j*, and *t* denote corporate, sovereign, and time on a daily basis, respectively.

The regression includes observations for all days but focuses on the correlation between sovereign and corporate CDS on days with news releases. In this case, β would measure the correlation between sovereign and corporate CDS on a typical day without a corporate news release; and η would be the coefficient of interest, measuring the extra correlation between sovereign and corporate CDS on a day with a corporate news release. This specification allows me to contrast the "causal" effect of corporate CDS on sovereign CDS on dates with news releases with the "noncausal" baseline correlation between the two variables on other dates. This would give my estimates a natural difference-in-difference interpretation. Table 1.9 reports the estimation results. The coefficients on the interaction term are positive and significant at the 1-percent level, consistent with the results in the high-frequency event study analysis. Table A.10 reports the estimation results with standardized beta coefficients and with all channels included. The coefficient on triple interaction term of SOE is significantly positive at 1-percent level, confirming again the prominent role of state ownership.

Table 1.9: Regression Results with News Dummy

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

Independent variable	(1)	(2)	(3)	(4)
$\Delta Log(corporate\ CDS)_{ijt}$	0.227***	0.219***	0.213***	0.206***
	(9.20)	(7.66)	(7.63)	(7.60)
$\Delta Log(corporate\ CDS)_{ijt} * NEWS$	0.105***	0.095***	0.093***	0.091***
	(14.19)	(13.29)	(13.30)	(13.42)
$\Delta Log(stock\ index)_{jt}$		-0.676***	-0.651***	-0.620***
		(-36.08)	(-34.96)	(-35.60)
$\Delta Log(commodity\ price)_{jt}$			-0.142***	-0.135***
			(-11.86)	(-12.13)
$\Delta Log(exchange\ rate)_{jt}$				0.431***
				(16.16)
Country FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	35,734	29,743	29,743	29,743

Note: *t* statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Two-day Event Window. Sometimes market players act before the formal release of news recorded in Factiva. This may be because some news outlets have more timely reporting of corporate news. For example, *www.upstreamonline.com* is a website that has the timeliest reporting of oil companies. Time zone differences can also lead to market players in some continents act faster than others. To consider such effect, I use a two-day event window to check the robustness of my results. This time frame is also used in Hébert and Schreger (2017). Consider a news release at 2pm EDT on Wednesday, November 9, 2016. The two-day event window, applied to this event, would use the CDS rate change from the close on Monday, November 7, to the close on Wednesday, November 9th. For this specification, two-day windows are applied to all variables. Table 1.10 reports the baseline regression results using one-day and two-

day event-windows side by side. Two sets of results are qualitatively and quantitatively similar, indicating that there is evidence for such a market anticipation effect. Results on three transmission channels are reported in Table A.11 - A.13 in the Appendix.

Falsification Test. If changes in corporate CDS rates are driving variation in sovereign CDS rates only on the day of the news release, I should not observe a significant impact of corporate CDS changes on lagged sovereign CDS changes. Table 1.11 reports the baseline regression results using sovereign CDS changes and lagged sovereign CDS changes side by side. While the coefficients of corporate CDS are still statistically significant, the magnitudes are only about one-third the size. Table A.14 - A.16 in the Appendix report the regression results for this falsification test for three channels. For tests of the fiscal channel, the main coefficients on corporate CDS rates are much smaller than those reported in the main results, while the state ownership and government-dependent sector interaction terms are no longer statistically significant. For tests of the size channel, the coefficient of corporate CDS rates is no longer statistically significant. Although the coefficients of the three interaction terms are still statistically significant, their magnitudes are much smaller. For tests of financial channel, the coefficients of bank CDS rates are no longer statistically significant.

Table 1.10: Two-day Event Window Results - Baseline Regression

Dependent variable: $Log(sovereign\ CDS)_{ij,t} - Log(sovereign\ CDS)_{ij,t-2}$

	one-day window	two-day window	one-day window	two-day window	one-day window	two-day window	one-day window	two-day window
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Log(corporate\ CDS)_{ijt}$	0.335***	0.380***	0.307***	0.355***	0.303***	0.326***	0.297***	0.317***
	(5.58)	(5.41)	(4.97)	(4.74)	(4.97)	(4.68)	(4.95)	(4.95)
$\Delta Log(stock\ index)_{jt}$			-0.542***	-0.610***	-0.529***	-0.590***	-0.513***	-0.561***
			(-16.96)	(-15.58)	(-16.76)	(-15.41)	(-17.01)	(-15.73)
$\Delta Log(commodity\ price)_{jt}$					-0.096***	-0.121***	-0.093***	-0.112***
					(-5.81)	(-7.52)	(-6.06)	(-7.54)
$\Delta Log(exchange\ rate)_{jt}$							0.268***	0.346***
							(7.90)	(6.66)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,201	10,188	9,107	9,020	9,107	9,020	9,107	9,020

Note: columns (1), (3), (5), and (7) report baseline regression results using a one-day event window. Columns (2), (4), (6), and (8) report baseline regression results using a two-day event window. T statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 1.11: Falsification Test Results - Baseline Regression

	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Log(corporate\ CDS)_{ijt}$	0.335***	0.092**	0.307***	0.090**	0.303***	0.090**	0.297***	0.079**
	(5.58)	(2.44)	(4.97)	(2.18)	(4.97)	(2.18)	(4.95)	(2.13)
$\Delta Log(stock\ index)_{jt}$			-0.542***	-0.098***	-0.529***	-0.100***	-0.513***	-0.065**
			(-16.96)	(-3.19)	(-16.76)	(-3.24)	(-17.01)	(-2.11)
$\Delta Log(commodity\ price)_{jt}$					-0.096***	-0.009	-0.093***	0.012
					(-5.81)	(-0.52)	(-6.06)	(0.76)
$\Delta Log(exchange\ rate)_{jt}$							0.268***	0.526***
							(7.90)	(7.20)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,201	5,023	9,107	4,680	9,107	4,680	9,107	4,680

Note: columns (1), (3), (5), and (7) report baseline regression results using $\Delta Log(SCDS)_{j,t}$ as the dependent variable. Columns (2), (4), (6), and (8) report baseline regression results using $\Delta Log(SCDS)_{j,t-1}$ as the dependent variable. T statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

1.4 Extreme Value Analysis: The Effects of Changes in Corporate Risk on Sovereign Risk

To capture the spillover from corporate to sovereign risk, I use a form of extreme value analysis, as described in Forbes (2013), to examine the incidence and patterns in extreme changes in corporate CDS rates over time. More specifically, I identify the dates during the period from January 2014 to December 2016 when each corporate has an extreme-positive or extreme-negative change in CDS rates, defined as a change in the top or bottom 5^{th} or 1^{st} percentile of the distribution of that corporation's changes in CDS rates. If extreme changes in corporate CDS rates have no impact on their sovereign, then there should be roughly a 5 or 1 percent possibility that the sovereign should experience extreme changes in CDS rates on the same day. However, if extreme changes in sovereign CDS rates are more likely when a corporate has extreme changes in CDS, it would suggest either spillovers or common shocks. Although this exercise cannot determine the direction of causality from corporate to sovereign, it can show the extent of co-movement.

1.4.1 Methodology

I estimate the conditional probability that a sovereign has an extreme change in its CDS rate on any day as a function of its corporate and bank counterparts, also having an extreme change in their CDS rates, as well as global shocks. The method helps disentangle the effect of global shocks from linkages between corporations and sovereigns. I include different observable global shocks at a daily frequency: the change in the commodity price relevant to the corporate, the change in the VIX as a

proxy for global financial volatility, and the US repo rate and TED spread. The formal specification is:

$$Prob\left(EC_{it}^{S}=1\right)=F(\alpha_{it}+\beta\cdot Global_{t}+\gamma\cdot EC_{it}^{C}+\zeta\cdot EC_{it}^{B}) \qquad \text{Equation 8}$$

where EC_{it}^{S} is a dummy equal to 1 if sovereign *i* experiences an extreme change (positive or negative) in its CDS rate on day *t*, EC_{it}^{C} is a dummy equal to 1 if the corporation associated with sovereign *i* experiences an extreme change in its CDS rate on day *t*, and EC_{it}^{B} is a dummy equal to 1 if the average bank CDS rates associated with sovereign *i* experience an extreme change on day *t*. *Global* measures global shocks on day *t*.

Following Forbes (2013), the appropriate methodology to estimate Equation 8 is determined by the cumulative distribution function of $(\alpha_{it}+\beta\cdot Global_{t}+\gamma\cdot EC_{it}^{C}+\zeta\cdot EC_{it}^{B})$, $F(\cdot)$. Because extreme changes in CDS rates occur irregularly, $F(\cdot)$ is asymmetric. Therefore, I estimate Equation 8 using the complementary logarithmic (or cloglog) framework, which assumes that $F(z)=1-\exp\{-\exp(z)\}$ is the cumulative distribution function of the extreme value distribution. This distribution fits maximum likelihood models with dichotomous dependent variables coded as 0/1. I also cluster standard errors by country.

1.4.2 Data and Summary Statistics

The sample includes CDS data available in Markit from 1/1/2014 to 12/29/2016. The corporations and banks covered are the same as those listed in Table A.2 and Table A.3. To mitigate the effect of sovereign-bank linkages, I control for dates with extreme values for changes in bank CDS rate in each regression. Event dates with news releases

on sovereign credit ratings are excluded, which results in a total of 2,300 observations being dropped from the sample. Table 1.12 and Table 1.13 tabulate the incidence of extreme changes in both corporate and sovereign CDS rates for each country in the sample at the 5^{th}-percentile and 1^{st}-percentile thresholds, respectively.

The coincidence of extreme changes in both CDS is only a rough proxy for spillovers from corporate to sovereign risk. The spillovers could run in the opposite direction; alternatively, the two sectors could experience substantial changes in risk simultaneously due to a global shock, such as commodity prices or U.S. monetary policy. To control for the effects of global shocks, I include a set of global variables in the regression. Global shocks are measured in absolute values since they are not expected to have linear effects. Table 1.14 reports descriptive statistics for measures of global shocks expressed in absolute values.

Table 1.12: Incidence of Extreme Changes in Corporate and Sovereign CDS Rates (5^{th}-percentile Threshold)

Dummy=1 if corporate experiences extreme change	Dummy=1 if sovereign experiences extreme change		
Brazil	0	1	Total
0	4,871	343	5,214
1	341	249	590
Total	5,212	592	5,804
Chile	0	1	Total
0	4,871	343	5,214
1	341	249	590
Total	5,212	592	5,804
China	0	1	Total
0	3,278	253	3,531
1	253	147	400
Total	3,531	400	3,931
Malaysia	0	1	Total
0	3,756	146	3,902
1	146	296	442
Total	3,902	442	4,344
Mexico	0	1	Total
0	3,916	260	4,176
1	260	214	474
Total	4,176	474	4,650
Philippines	0	1	Total
0	1,548	156	1,704
1	156	40	196
Total	1,704	196	1,900
Russia	0	1	Total
0	5,427	295	5,722
1	295	351	646
Total	5,722	646	6,368
South Africa	0	1	Total
0	2,498	194	2,692
1	194	108	302
Total	2,692	302	2,994
Thailand	0	1	Total
0	2,508	190	2,698
1	190	114	304
Total	2,698	304	3,002

Source: Markit.

Table 1.13: Incidence of Extreme Changes in Corporate and Sovereign CDS Rates (1^{st}-percentile Threshold)

Dummy=1 if corporate experiences extreme change	Dummy=1 if sovereign experiences extreme change		
Brazil	0	1	Total
0	5,573	105	5,678
1	105	21	126
Total	5,678	126	5,804
Chile	0	1	Total
0	3,768	74	3,842
1	74	10	84
Total	3,842	84	3,926
China	0	1	Total
0	3,782	65	3,847
1	65	19	84
Total	3,847	84	3,931
Malaysia	0	1	Total
0	4,219	35	4,254
1	35	55	90
Total	4,254	90	4,344
Mexico	0	1	Total
0	4,488	62	4,550
1	62	38	100
Total	4,550	100	4,650
Philippines	0	1	Total
0	1,825	35	1,860
1	35	5	40
Total	1,860	40	1,900
Russia	0	1	Total
0	6,156	70	6,226
1	70	72	142
Total	6,226	142	6,368
South Africa	0	1	Total
0	2,881	49	2,930
1	49	15	64
Total	2,930	64	2,994
Thailand	0	1	Total
0	2,892	46	2,938
1	46	18	64
Total	2,938	64	3,002

Source: Markit.

Table 1.14: Summary Statistics for Measures of Global Shocks

	Obs.	Mean	St. Dev.	Min	Median	Max.	Skew.	Kurt.
Daily change in Commodity Price	34,630	2.114	10.28	0.000	0.660	320.5	12.81	214.0
Daily change in TED Spread	34,630	1.364	1.872	0.000	1.000	28.00	3.496	22.49
Daily change in US Repo Rate	34,630	0.004	0.016	0.000	0.000	0.190	7.329	71.85
Daily change in VIX	32,426	1.067	1.241	0.000	0.720	14.64	3.570	24.42

Source: Thomson Reuters Datastream and the Chicago Board Options Exchange.

1.4.3 Discussion of Main Results

Table 1.15 reports regression results including only extreme changes in corporate and bank CDS rates, and then including different combinations of controls for global shocks. For each specification, the estimates show that an extreme change in a corporate CDS rate is significantly and positively correlated with the probability of observing an extreme change in the associated sovereign CDS rate on that day. The coefficients indicate that the latter possibility increases by a factor of about 5.5 (i.e., $exp(1.872)$-1). These results are robust to controlling for global shocks, suggesting that much of this joint coincidence results from contagion between corporations and their sovereigns or from local shocks. The effects are even more substantial (by a factor of 16.7) when extreme values are defined using the 1st percentile instead of the 5th percentile as the threshold (see Table 1.16). Results for regressions with extreme values for bank CDS excluded are similar and are available in Table A.17 and Table A.18.

Similar to our high-frequency event-study analysis, I test the three possible transmission channels. For the fiscal channel, Table 1.17 shows that the additional correlation between extreme changes in corporate and sovereign CDS rates associated

with SOEs is statistically significant no matter which cutoff is used to define SOEs. SOEs and their sovereigns are especially likely to experience extreme changes in CDS rates at the same time. This result is more robust to the SOE threshold definition than the comparable result from the high-frequency event-study analysis. Meanwhile, the extra correlation from corporations operating in "government-dependent" sectors is only statistically significant when I use the 75th percentile as the cutoff to define the *GOV* dummy, not the 50th percentile. For the size channel, Table 1.18 shows that extreme changes in CDS rates of corporations with total liabilities above the 75th percentile have an extra correlation with extreme changes in CDS rates of their sovereigns. When I define the size dummy by total assets and corporate income tax payments, the coefficients are weakly or not statistically significant. For the financial channel, Table 1.19 shows that the coefficient of the bank stress interaction term is not significant. It indicates that an extreme change in bank CDS rate when the country experiences financial market news releases does not contribute to more correlation with extreme changes in CDS rates of their sovereigns.

Table 1.15: Extreme Value Analysis - Results (5^{th}-percentile Threshold)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day *t*

Independent variable	(1)	(2)	(3)	(4)	(5)
Dummy for corp. CDS extreme changes	1.989***	1.988***	1.963***	1.960***	1.872***
	(8.70)	(8.70)	(8.37)	(8.42)	(8.07)
Dummy for bank CDS extreme changes	1.192***	1.192***	1.162***	1.163***	1.138***
	(4.10)	(4.09)	(3.99)	(3.98)	(4.09)
Daily change in commodity price		0.003***	0.003***	0.003***	0.003***
		(5.72)	(5.84)	(5.74)	(6.46)
Daily change in TED spread			0.094***	0.094***	0.077***
			(6.55)	(6.73)	(5.12)
Daily change in US Repo rate				-8.641**	-7.351*
				(-2.17)	(-1.79)
Daily change in VIX					1.999***
					(8.15)
Observations	34,614	34,614	34,614	34,614	32,411

Note: standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 1.16: Extreme Value Analysis - Results (1st-percentile Threshold)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day *t*

Independent variable	(1)	(2)	(3)	(4)	(5)
Dummy for corp. CDS extreme changes	3.008***	3.004***	2.950***	2.948***	2.814***
	(12.13)	(12.08)	(11.35)	(11.83)	(10.89)
Dummy for bank CDS extreme changes	1.682***	1.686***	1.685***	1.721***	1.646***
	(5.72)	(5.69)	(6.06)	(6.45)	(6.51)
Daily change in commodity price		0.005***	0.005***	0.004***	0.005***
		(3.13)	(3.01)	(2.87)	(3.24)
Daily change in TED spread			0.090***	0.094***	0.058
			(2.60)	(2.66)	(1.60)
Daily change in US Repo rate				-29.69	-28.95*
				(-1.63)	(-1.66)
Daily change in VIX					0.175***
					(5.95)
Observations	34,614	34,614	34,614	34,614	32,411

Note: standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 1.17: Extreme Value Analysis Results – Fiscal Channel (5th-percentile Threshold)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day *t*

	State Ownership (firm-level)				Gov. Dependence (sector-level)	
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
Dummy for corp. CDS extreme changes	1.782***	1.840***	1.917***	1.913***	1.889***	1.912***
	(7.42)	(7.63)	(8.91)	(8.90)	(8.46)	(8.73)
Dummy for bank CDS extreme changes	1.183***	1.186***	1.186***	1.186***	1.192***	1.187***
	(4.14)	(4.15)	(4.16)	(4.15)	(4.23)	(4.17)
SOE_{30}·Dummy for corp. CDS extreme changes	0.356**					
	(2.28)					
SOE_{50}·Dummy for corp. CDS extreme changes		0.287**				
		(2.32)				
SOE_{80}·Dummy for corp. CDS extreme changes			0.220***			
			(2.77)			
SOE_{100}·Dummy for corp. CDS extreme changes				0.249***		
				(2.85)		
GOV_{50}·Dummy for corp. CDS extreme changes					0.192	
					(1.10)	
GOV_{75}·Dummy for corp. CDS extreme changes						0.442***
						(3.00)
Daily change in commodity price	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(3.01)	(2.99)	(3.26)	(3.30)	(3.46)	(3.27)
Daily change in TED spread	0.004	0.004	0.004	0.004	0.004	0.004
	(0.21)	(0.21)	(0.20)	(0.20)	(0.22)	(0.21)
Daily change in US Repo rate	-2.079	-2.082	-2.155	-2.150	-2.108	-2.062
	(-1.47)	(-1.48)	(-1.52)	(-1.53)	(-1.47)	(-1.39)
Daily change in VIX	-0.035**	-0.035**	-0.036**	-0.036**	-0.036**	-0.036**
	(-2.08)	(-2.08)	(-2.17)	(-2.16)	(-2.12)	(-2.15)
Observations	34,628	34,628	34,628	34,628	34,628	34,628

Note: columns (1) to (4) interact a dummy for corporate CDS extreme changes with different *SOE*, which is a dummy for whether the corporation has ultimate state ownership strictly higher than 30%, 50%, 80%, and wholly owned by the government (100%), respectively. Columns (5) and (6) interact a dummy for corporate CDS extreme changes with different *GOV*, which is a dummy for whether the corporation operates in a sector with "government dependence" variable higher than 50th and 75th percentile among all sectors in its country. Standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 1.18: Extreme Value Analysis Results – Size Channel (5^{th}-percentile Threshold)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day *t*

	Total Assets	Total Liabilities	Taxation
Independent variable	(1)	(2)	(3)
Dummy for corp. CDS extreme changes	1.842***	1.822***	1.842***
	(8.89)	(8.93)	(9.63)
Dummy for bank CDS extreme changes	1.187***	1.187***	1.189***
	(4.15)	(4.16)	(4.18)
ASST · Dummy for corp. CDS extreme changes	0.279*		
	(1.94)		
LIAB · Dummy for corp. CDS extreme changes		0.293**	
		(2.30)	
TAX · Dummy for corp. CDS extreme changes			0.170
			(1.08)
Daily change in commodity price	0.003***	0.003***	0.003***
	(3.40)	(3.23)	(3.21)
Daily change in TED spread	0.005	0.005	0.004
	(0.24)	(0.22)	(0.21)
Daily change in US Repo rate	-2.043	-2.075	-2.031
	(-1.46)	(-1.49)	(-1.44)
Daily change in VIX	-0.035**	-0.035**	-0.035**
	(-2.08)	(-2.08)	(-2.09)
Observations	34,628	34,628	34,628

Note: columns (1) interacts a dummy for corporate CDS extreme changes with ASST, which is a dummy for whether the corporation has total asset higher than the 75^{th} percentile of its country level; columns (2) interacts a dummy for corporate CDS extreme changes with LIAB, which is a dummy for whether the corporation has total liabilities higher than 75^{th} percentile of its country level; columns (3) interacts a dummy for corporate CDS extreme changes with TAX, which is a dummy for whether the corporation has total taxation higher than 75^{th} percentile of its country level. Standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 1.19: Extreme Value Analysis Results - Financial Channel (5^{th}-percentile Threshold)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day t

	Bank Stress Country-level
Independent variable	(1)
Dummy for corp. CDS extreme changes	1.906***
	(6.40)
BANK · Dummy for bank CDS extreme changes	0.102
	(0.41)
Dummy for bank CDS extreme changes	1.191***
	(4.18)
Daily change in commodity price	0.003***
	(3.41)
Daily change in TED spread	0.004
	(0.21)
Daily change in US Repo rate	-2.142
	(-1.47)
Daily change in VIX	-0.036**
	(-2.09)
Observations	34,628

Note: column (1) interacts a dummy for bank CDS extreme changes with *BANK*, which takes a value of one if country *j* on date *t* experiences a news release on any of the banks included in the sample and zero otherwise. Standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

1.5 Conclusion

In this paper, I examine the link between credit risks of corporations and those of their sovereigns. I construct a novel data set that combines corporate- and sovereign-level daily data on CDS rates and daily corporate news in 9 EMs from 1/1/2014 to 12/29/2016. Using this data set, I show that post-news changes in corporations' CDS rates have a significant impact on changes in sovereign CDS rates. I treat daily news releases on corporate credit conditions as indicators of exogenous shocks and isolate

the effect of corporate credit risk on sovereign credit risk by constructing a one-day event window around each news release. The results indicate that potential government bailouts or other spillovers from SOEs, government-dependent firms, and large corporations may elevate sovereign credit risk in emerging markets. Stress in the domestic banking sector also contributes to credit risk spillovers from corporations to sovereigns. Being an SOE has the most prominent effect among all channels.

Additionally, an extreme value analysis shows that extreme changes in sovereign CDS rates are more likely when SOEs, government-dependent firms, and large corporations in the same country also experience extreme changes in their CDS rates. These results are robust when I control for common global shocks and extreme changes in domestic bank CDS rates.

Overall, I consider the spillovers of credit risk from SOEs, government-dependent firms, and large corporations to sovereign credit risk in EMs as reflecting a significant cost of implicit government guarantees of private debt. I believe that incorporating the cost of such bailouts into measures of sovereign credit risk in EMs has critical implications for monitoring sovereign defaults and designing fiscal policies.

2 Chapter 2: Drivers of Sovereign CDS Rates in Emerging Markets: Before, During, and After the Global Financial Crisis

2.1 Introduction

Understanding the drivers of sovereign credit risk in EMs is crucial given that EMs are about ten times more likely to default on sovereign debt than are their advanced peers, and sovereign defaults are associated with deep recessions and restricted accessibility to global credit market (see Mendoza and Yue, 2012; Arteta and Hale, 2007). Literature has well documented a combination of domestic and external factors that could affect EMs' sovereign credit risk. [14] For EMs, is the sovereign credit risk mainly driven by country-specific or global factors? There may not be a simple answer to this question due to the outbreak of the 2007-2009 Global Financial Crisis (GFC), which started as a downturn in the U.S. subprime mortgage market but quickly spread to the rest of the world as a severe economic crisis. The roles of country-specific and global factors in affecting EMs' sovereign CDS rates may have changed before, during, and after the GFC.

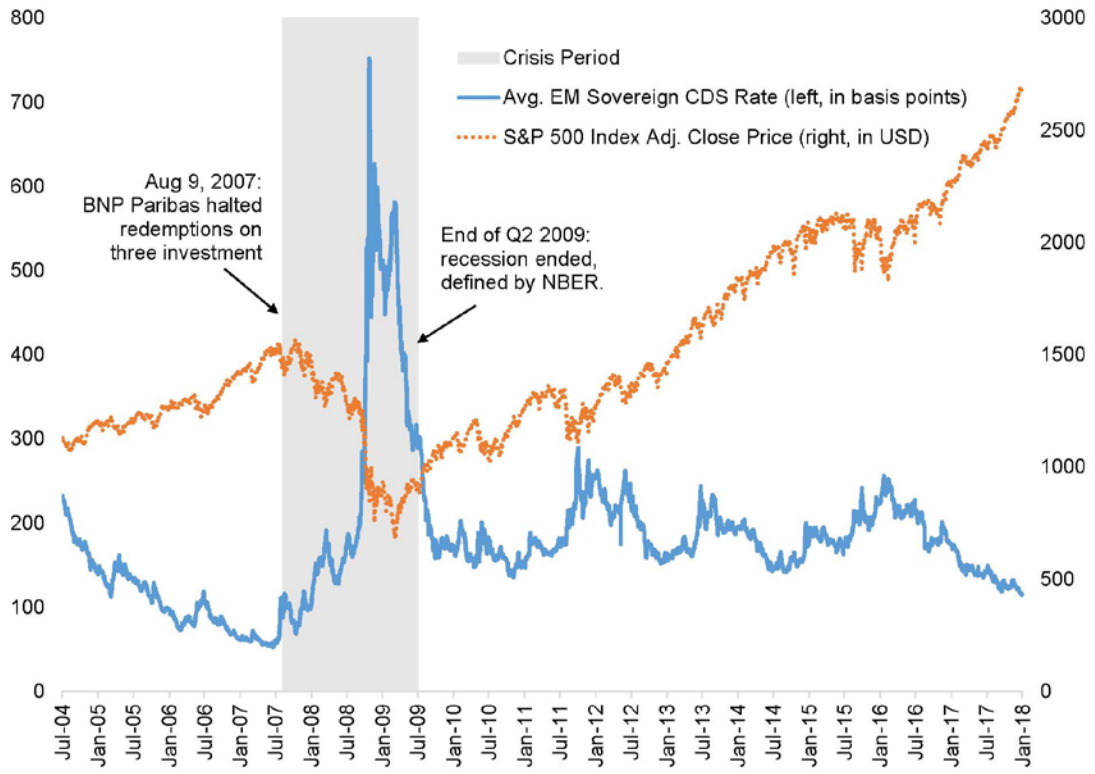
To get an idea of how EMs' sovereign CDS rates evolved around the GFC period, Figure 2.1 plots the equal-weighted average of sovereign CDS rates for a sample of 17 EMs against the daily adjusted closing price of the S&P 500 Index in Figure 2.1. The latter measures the stock performance of 500 large companies listed on stock exchanges in the U.S. and serves as an indicator of the global financial market. The figure shows that between the start of my sample period and the start of the GFC

[14] See Section 2.2 for detailed discussion.

on August 9, 2007, when BNP Paribas halted redemptions on three investment funds, the average level of sovereign CDS rates in EMs gradually decreased. This could be a sign of the economic maturity reached by their domestic economies.[15] During the crisis period (the grey area in the figure), the dip of the U.S. stock market index was accompanied by a hike of EMs' average sovereign CDS rates. After the GFC ended following the second quarter of 2009, the negative relation between these two time series is not so obvious.[16] One could argue that the U.S. stock market, among other global factors, continued to exert a significant impact on the pricing of EMs' sovereign CDS rates during this period, or that country-specific determinants took back their dominant role as the economy returned.

This chapter aims to examine such structural changes using daily data on sovereign CDS rates of 17 EMs and a relatively comprehensive list of potential explanatory variables from July 2004 to December 2017. The variables cover possible drivers of sovereign CDS rates at both country-specific (or local) and global levels. The local drivers included in the study are (1) the stock market return, (2) the exchange rate against the U.S. dollar, and (3) foreign currency reserves. The global drivers, which intend to reflect global-market conditions, are grouped into four categories: (1) U.S. financial market, (2) global risk premiums, (3) global investment flows, and (4) CDS rates of other sovereigns. Three main findings arise from the analysis.

[15] See Korinek, Roitman, and Végh (2010)
[16] See Table B.1 in the Appendix for a more detailed timeline of selected major events during the GFC.



Source: Bloomberg and Markit.

Figure 2.1: Average Sovereign CDS Rate in EMs and U.S. Stock Market Index

First, the level of commonality in EMs' sovereign CDS rates increased during the GFC period. Subsequently, it remained at a level higher than that observed during the pre-crisis period, indicating that the common influences that drove EMs' sovereign CDS rates during the period of turmoil time were still at work even after the GFC ended. The first principal component explains 34 percent of the variation in sovereign CDS rates in the pre-crisis period. This share rises to 60 percent during the GFC period and stays as high as 48 percent in the post-crisis period. Second, regression analysis shows that the local stock market return and exchange rate against the U.S. dollar have significant explanatory power for that country's sovereign CDS rate throughout all

three sub-periods. Third, all four categories of global variables significantly drive EMs' sovereign CDS rates during the GFC period and continue to play an essential role in the post-crisis period. However, the impact of variables within each category varies over time. This finding supports the existence of spillovers from developments in global and particularly U.S. financial markets to the funding costs of EM sovereign borrowers.

The paper has several implications for both policymakers and global investors. First, my finding that the local factors have a significant impact on that country's sovereign credit risk in both normal and turmoil times suggests that, in terms of sovereign risk management, country authorities should always keep an eye on own country fundamentals. Second, global conditions in the post-crisis period are more important for EMs than in the pre-crisis period. Accounting for global factors, especially U.S. stock and bond market conditions, may have significant consequences for the design of monetary policy and monitoring of the sovereign credit risk in EMs. Third, I find that capital flows from global equity and bond funds fostered financial recoupling of EMs in the post-crisis period. The finding implies that such financial integration may strengthen the influence of shifts in the risk appetite and liquidity preferences of global investors who are prone to cross-market arbitrage and hedging.

The remainder of this chapter is organized as follows. Section 2.2 presents a brief review of the literature. Section 2.3 describes the sovereign CDS data and the explanatory variables included in the regression analysis. Section 2.4 explores the commonality in sovereign CDS rates using Principal Component Analysis. Section 2.5

describes the econometric methodology, discusses the main results, and reports robustness tests. Section 2.6 offers some concluding remarks.

2.2 Related Literature

This paper is mainly related to two strands of literature. First, it contributes to the understanding of sovereign CDS pricing. Many studies have documented important determinants of sovereign credit risk. For example, Longstaff, Pan, Pedersen, and Singleton (2011) find that the majority of sovereign credit risk in 26 EM and advanced economies can be linked to global factors, especially to conditions in U.S. stock and high-yield markets. Dieckmann and Plank (2012) document that the state of a country's financial system and the global financial system have powerful explanatory power for the behavior of sovereign CDS spreads. Aizenman, Hutchison, and Jinjarak (2013) demonstrate that fiscal space and other macroeconomic factors are statistically and economically significant determinants of sovereign risk for Eurozone Periphery countries. Fender, Hayo, and Neuenkirch (2012) use a GARCH framework to show that sovereign CDS spreads of 12 EMs are more related to global and regional risk premia than to country-specific risk factors, especially during the GFC. Fabozzi, Giacometti, and Tsuchida (2016) identify three factors that impact weekly sovereign CDS spreads of 7 Eurozone countries: a peripheral factor, a global factor, and a Eurozone common factor. They show that the source of volatility for CDS spreads shifted from the global factor in 2009 and the peripheral factor in 2010 to the Eurozone common factor in 2012. Du and Schreger (2017) show that a higher reliance on external foreign currency corporate financing leads to a higher probability of sovereign default in local currency.

Within this strand of literature, my study is most closely related to Longstaff et al. (2011) and Fender, Hayo, and Neuenkirch (2012). This paper takes Longstaff et al. (2011) as a starting point, but my methodology differs from theirs in several ways. First, Longstaff et al. (2011) use end-month data on sovereign CDS contracts. However, data at lower frequency tend to show higher correlations and lead to estimation bias. My study mitigates this issue by utilizing daily sovereign CDS data. Second, I run regressions both for the whole sample period and for three sub-periods: before, during, and after the GFC. This enables me to examine time-varying effects of explanatory variables on sovereign CDS rates. Third, in addition to the variables incorporated in Longstaff et al. (2011), I add several other variables that have been demonstrated to be significant drivers of sovereign CDS rates. Fourth, I use a panel-regression framework and provide point estimates of standardized beta coefficients instead of only reporting t-statistics at the country level, as Longstaff et al. (2011) do. Standardized beta coefficients show the standard-deviation change in the dependent variable resulting from a one-standard-deviation change in an independent variable. This makes results comparable across different independent variables and across three sub-periods.

My paper also extends the work of Fender et al. (2012) in two ways. First, I include a much broader set of variables at a daily frequency than what Fender et al. (2012) cover in their study. Second, I examine a larger sample of EMs (17 versus 12 countries) for a more extended period (July 2004- December 2017 versus April 2002 - December 2011). This allows me to examine more systematically the impact of local and global forces on sovereign CDS rates not only in the pre-crisis and crisis periods

but also in the post-crisis period. This expanded data coverage provides a better understanding of market dynamics around the crisis period.

Second, this paper adds to the literature on the "decoupling-recoupling hypothesis" by providing evidence from the perspective of sovereign CDS rates. The hypothesis states that from early 2007 to mid-2008, EMs seemed to be isolated from the financial problems originating in the U.S., as a sign of their economic maturity ("decoupling"). However, after mid-2008, especially after the bankruptcy of Lehman Brothers in September 2008, the crisis began to affect countries all around the world, with no exception for EMs ("recoupling"). Korinek, Roitman, and Végh (2010) develop a stylized model that captures these observed phenomena. Dooley and Hutchison (2009) use a regression "event study" approach to show that starting in summer 2008, financial and real economic news shocks emanating from the U.S. began to have significant impacts on sovereign CDS rates of 14 EMs. Felices and Wieladek (2012) examine two vulnerability indicators of financial crises (real exchange rate appreciation and international reserve growth) in 41 sample countries and find that, before the onset of the subprime crisis, there was little evidence of decoupling for most countries. However, some countries did show a gradual and persistent decline in their exposure to global factors. Yeyati and Williams (2012) document that EMs reduced their business cycle co-movements with the advanced economies in the 2000s, while on the financial front, the co-movement between EM and global asset prices rose steadily in the late 2000s, even before the GFC.

My paper suggests that, prior to the collapse of Lehman Brothers, there was some degree of "decoupling" of EMs' sovereign CDS rates from conditions in the U.S.

financial market, including the stock market return, Treasury yields, and perceived volatility in the bond market. After September 2008, however, EM's sovereign CDS rates begin to be affected by a broader range of global factors, and this impact persisted after the GFC ended. This finding lends support to the "recoupling" part of the hypothesis.

2.3 Data

The sample covers dates from 07/01/2004 to 12/31/2017 and has a total of 59,549 daily observations. To compare the influence of global and local variables during pre-crisis, crisis, and post-crisis periods, I split the sample into three parts: the pre-crisis subsample (07/01/2004 - 08/08/2007), this crisis subsample (08/09/2007 - 06/30/2009), and the post-crisis subsample (07/01/2009 - 12/31/2017).[17] The data set used in this study is described in more detail below.

2.3.1 Creating A Sample of EM Sovereign CDS Rates

I obtain daily pricing data for sovereign CDS from the Markit database. Markit is one of the most widely employed CDS databases in finance and economics literature. Papers that employ this dataset include Acharya and Johnson (2007), Jorion and Zhang (2007), Zhang, Zhou, and Zhu (2009), and Hébert and Schreger (2017). Markit collects more than a million CDS quotes contributed by more than 30 major market participants on a daily basis and provides end-of-day (i.e., 4pm EDT) CDS single name composites on approximately 2,600 entities. The quotes are subject to a curve-based cleaning

[17] I also consider several other split points in the data to examine pre-crisis, crisis, and post-crisis effects. The results are shown in the section discussing robustness tests.

process that removes outliers and stale observations. Markit then computes a daily composite spread as long as it has two or more contributors. I focus on the available universe of sovereign 5-year CDS markets since the 5-year maturity is the most liquid type traded in CDS markets. These CDS are all denominated in U.S. dollars, which eliminates confounding pricing effects from exchange rates on CDS rates.

I apply several filters to the CDS data to mitigate bias from missing or stale data, following the existing literature (Bedendo and Colla, 2015; Berndt and Obreja, 2010; Schneider, Sögner, and Veža, 2010). First, I exclude CDS for which the most extended series of consecutive missing rates covers more than two weeks. Second, I exclude CDS for which the percentage of missing data exceeds 15% of the whole period. Third, I exclude stale observations with zero changes in sovereign CDS rates. Finally, to reduce the effect of possibly spurious outliers, I winsorize the sovereign CDS rates for each country at the 1% and 99% levels. This methodology results in a sample of 17 EMs covered by the MSCI Emerging Markets Index: Brazil, Chile, China, Czech Republic, Egypt, Indonesia, Korea (Republic of), Malaysia, Mexico, Pakistan, Peru, Philippines, Qatar, Russia, South Africa, Thailand, and Turkey. All countries are included in the sample for the full period. These 17 EMs are covered in the Markit database throughout the whole period, so there is no entry/exit effect.

Table 2.1 presents descriptive statistics for daily changes in sovereign CDS rates for the whole sample and by each country. All rates are denominated in basis points. The numbers show that there are significant cross-country and time-series variations in daily changes of sovereign CDS rates.

Table 2.1: Descriptive Statistics for Daily Changes in Sovereign CDS Rates

	Obs.	Mean	St. Dev.	Min.	Median	Max.	Skew.	Kurt.
Whole Sample	59549	-0.046	6.171	-64.48	-0.005	65.48	0.370	32.58
Brazil	3503	-0.162	8.024	-56.96	-0.165	59.45	0.411	15.03
Chile	3503	0.001	2.773	-10.09	0.000	11.03	0.245	7.780
China	3503	-0.008	2.662	-8.277	-0.030	9.698	0.381	6.382
Czech Republic	3503	-0.003	2.174	-0.847	0.000	9.129	0.359	10.88
Egypt	3503	-0.002	5.931	-26.17	0.000	27.26	0.037	10.17
Indonesia	3503	-0.204	6.671	-24.76	-0.222	26.00	0.075	7.611
Korea (Rep. of)	3503	-0.013	3.796	-14.22	-0.062	15.86	0.392	9.731
Malaysia	3503	-0.012	3.630	-12.08	-0.048	13.10	0.267	6.796
Mexico	3503	-0.030	4.738	-17.62	-0.068	19.50	0.282	8.076
Pakistan	3503	0.174	14.47	-64.48	0.000	65.84	0.277	14.40
Peru	3503	-0.111	5.578	-21.67	-0.190	26.80	0.598	9.270
Philippines	3503	-0.143	5.433	-19.41	-0.164	19.73	0.131	6.839
Qatar	3503	-0.008	2.185	-8.238	0.000	8.786	0.338	8.981
Russia	3503	-0.148	7.792	-29.29	-0.076	27.47	-0.160	7.053
South Africa	3503	-0.019	5.382	-17.33	-0.058	18.77	0.172	6.012
Thailand	3503	0.004	3.326	-11.00	-0.044	11.91	0.311	6.783
Turkey	3503	-0.093	7.638	-30.82	-0.213	34.53	0.358	7.644

Note: Sovereign CDS data cover dates from 7/1/2004 to 12/31/2017. CDS rates are measured in basis points.
Source: Markit and the author's calculation.

2.3.2 Explanatory Variables

My analysis incorporates a relatively comprehensive list of both local and global variables, as documented by the literature, that have the potential to explain movements of sovereign CDS rates in EMs.

2.3.2.1 Local Variables

The possibility of sovereign defaults which sovereign CDS contracts aim to insure against, is closely associated with the state of the local economy. The less favorable the domestic economy is, the harder it is for the country to maintain debt service in the face of adverse shocks, and consequently, the higher the possibility of a sovereign default. Tomz and Wright (2007) document such a negative relationship between economic output in the borrowing country and default on loans from private foreign creditors for the period 1820-2004.

To capture information about the local economy, I include several financial and macroeconomic variables in this study. Details about each variable's definition, frequency, and source of data are described in Table B.2 in the Appendix, and similarly for all other explanatory variables.

Local Stock Market Returns, calculated as the daily percentage change in the adjusted closing price of a country's major stock market index. It serves as an indicator for overall consumer and business confidence about the performance of a mix of local companies.[18]

Exchange Rates, measured as the daily percentage change in the units of the local currency per U.S. dollar, reflect a country's economic activity, growth prospects,

[18] The major stock market index for each country used in this study is Ibovespa Brasil Sao Paulo Stock Exchange Index (Brazil), Santiago Stock Exchange General Index (Chile), Shanghai Stock Exchange Composite Index (China), Prague Stock Exchange Index (Czech Republic), Egyptian Exchange EGX 30 Price Index (Egypt), Jakarta Composite Index (Indonesia), KOSI Composite Index (Korea), FTSE Bursa Malaysia KLCI Index (Malaysia), IPC Index (Mexico), Karachi Stock Exchange Index (Pakistan), BVL General Index (Peru), PSEi Index (Philippines), Qatar Exchange Index (Qatar), MOEX Russia Index (Russia), FTSE/JSE Africa All Share Index (South Africa), Stock Exchange of Thailand SET Index (Thailand), and Borsa Istanbul 100 Index (Turkey).

and geopolitical risk. The stronger the economy, the higher demand for the local currency in the global market.

Foreign Currency Reserves measures the monthly percentage change in the dollar value of a country's holdings of foreign reserves. This variable captures the country's capacity to service foreign-currency-denominated debt. Foreign currency reserves help reduce the likelihood of sovereign debt crises and improve a country's access to debt markets, as shown by Hernandez (2017).

2.3.2.2 Global Financial Variables

Following Longstaff et al. (2011), I also include four categories of global financial variables that reflect the state of the global economy. The literature has extensively documented that EMs' business cycles, and consequently their ability to repay sovereign debt, are affected by global business cycles. Deepened trade and financial-market integration elevate spillovers of macroeconomic fluctuations across countries (Kose, Prasad, and Terrones, 2003; Baxter and Kouparitsas, 2005; Kose, Prasad, Rogoff, and Wei, 2009).

The first category measures conditions in the **U.S. financial market**. As the world's largest economy, shocks to U.S. financial markets are spread globally and have a direct/indirect impact on the local economy and financial markets of my sample countries. For the U.S. equity market, I include the *U.S. Stock Market Excess Return*, which is the daily change in the value-weighted return on all NYSE, AMEX, and NASDAQ stocks, minus the one-month Treasury-bill return. This variable measures the overall performance of the U.S. equity market over and above the return on a risk-free investment. For U.S. bond markets, I include several indicators, aiming to reflect

variations in U.S. bonds' flight-to-quality element, which may also drive EMs' sovereign credit rates: (1) *Treasury Yields*, which is the daily change in the five-year constant maturity Treasury yield; (2) *U.S. Yield Curve Slope*, which is the daily change in the difference between the 10-year Treasury bond rate and the 3-month Treasury bill rate; (3) *MOVE Volatility Index*, which is the daily change in a yield-curve-weighted index of the volatility on 1-month Treasury options, capturing risk preferences in fixed income markets; (4) *Investment-Grade Spread*, which is the daily change in the basis-point yield spread between BBB and AAA industrial bond indexes, reflecting variations in investment-grade bond yields; and (5) *High-Yield Spread*, which is the daily changes in the basis-point yield spread between BB and BBB industrial bond indexes, reflecting variations in high-yield bond yields.

The second category measures the **global risk premiums**. I include three measures of risk premiums in the study: (1) *Equity Premium*, which is the daily change in the price-earnings ratio for the S&P 100 index, reflecting whether stock prices are generally overvalued or undervalued relative to earnings; (2) *Volatility Premium*, which is the daily change in the difference between the VIX index and Garman-Klass measure of realized volatility for the S&P 100 index, reflecting the difference between the stock market's expected and realized volatility; and (3) *Term Premium*, which is the expected excess return of five-year U.S. Treasury bonds, calculated using Fama-Bliss bond data and the model estimates presented in Cochrane and Piazzesi (2005).

The third category measures the **global investment flows**. As mentioned by Longstaff et al. (2011), herding and speculative behavior of investment flows affect the liquidity and prices of international assets, including sovereign debt. I use *Global*

Equity Flows and *Global Bond Flows* these two variables, which are defined as the monthly changes in the net new flows (inflow minus outflow) into all mutual funds worldwide investing primarily in equity and bonds, respectively.

The last category measures **CDS rates of other sovereigns**. To control for any other external influences on a country's sovereign CDS rates, I also include two measures of the changes in CDS rates of other sovereigns in the universe of the Markit CDS database. Countries with qualified CDS data are divided into six regions: Africa, Asia Pacific, Europe, Latin America, Middle East, and North America. The first measure, *Global Sovereign CDS rates*, is computed as the daily change in the average of CDS rates for all of countries outside that country's region. The second measure, *Regional Sovereign CDS rates*, is computed as the daily change in the average of CDS rates for all other countries in that country's region. Table 2.2 presents descriptive statistics for all explanatory variables.

2.4 Principal Component Analysis

In this section, I use Principal Component Analysis (PCA) to explore the variation in EMs' sovereign CDS rates, focusing on the differences across three sub-periods: before, during, and after the GFC.

I first compute the correlation matrix of daily sovereign CDS rate changes. Table B.3 reports the pairwise correlation coefficients of daily changes in the sovereign CDS rate for the sample countries. All of the pairwise correlations are positive, and the correlations of sovereign CDS rates within the same region tend to be high. For example, the correlation between Peru and Mexico is 84 percent, and the correlation

between the Philippines and Indonesia is 81 percent. Similar correlation matrices are computed for each of the three sub-periods as well.

Table 2.2: Descriptive Statistics for Explanatory Variables

	Obs.	Mean	St. Dev.	Min.	Median	Max.	Skew.	Kurt.
Local Variables								
Local Stock Market Return	57672	0.000	0.019	-0.217	-0.000	0.275	0.554	15.96
Exchange Rate	59549	0.000	0.007	-0.142	0.000	0.361	3.360	181.8
Foreign Currency Reserve	59549	0.006	0.040	-0.417	0.006	0.341	-0.748	22.18
U.S. Financial Market								
U.S. Stock Market Excess Return	57118	-0.000	0.017	-0.122	-0.001	0.131	0.577	13.86
Treasury Yields	57101	-0.000	0.058	-0.460	0.000	0.340	-0.125	7.031
U.S. Yield Curve Slope	57033	-0.001	0.070	-0.520	-0.000	0.740	0.326	16.01
MOVE Volatility Index	59549	-0.001	0.040	-0.426	-0.002	0.286	-0.096	11.46
Investment-Grade Spread	58869	-0.000	0.049	-1.520	-0.000	1.530	0.385	552.9
High-Yield Spread	58869	-0.000	0.066	-0.570	-0.000	0.600	0.538	14.59
Global Risk Premiums								
Equity Premium	59549	0.001	0.206	-5.030	0.005	2.091	-3.965	115.5
Volatility Premium	57543	-0.000	1.782	-17.51	-0.054	16.46	0.102	22.01
Term Premium	59549	0.000	0.005	-0.023	0.000	0.018	0.648	7.816
Global Investment Flows								
Global Equity Flow	59549	0.522	5.996	-14.88	0.143	64.42	7.692	85.63
Global Bond Flow	59549	-0.783	3.856	-24.05	-0.027	2.896	-5.031	28.77
CDS Rates of Other Sovereigns								
Global Sovereign CDS Rate	59549	-0.005	7.034	-39.61	-0.137	42.20	0.444	15.98
Regional Sovereign CDS Rate	59549	-0.022	6.771	-68.88	-0.094	75.04	0.474	52.12

Note: data cover dates from 7/1/2004 to 12/31/2017.
Source: see Table B.2 for details.

For comparison, I also calculate the correlation matrix between local stock returns for the same sample of countries. The correlation coefficients are reported in Table B.4. Compared to correlations for sovereign CDS rate changes, those for stock returns tend to be much smaller. This indicates that sovereign CDS rates may be more "global" and less "local" than stock market returns.

I then use these matrices to estimate the principal components for both daily sovereign CDS rate changes and local stock market returns. The fraction of variation captured by each of the first five principal components is presented in Table 2.3, for the entire sample period as well as three sub-periods.

Table 2.3: Principal Components Analysis Results

	Full Sample		Before Crisis		During Crisis		After Crisis	
Principal Component	Percent explained	Total	Percent explained	Total	Percent explained	Total	Percent explained	Total
Panel A								
CDS changes								
First	50.78	50.78	34.41	34.41	59.66	59.66	48.15	48.15
Second	13.15	64.93	12.31	46.71	10.62	70.28	16.26	64.41
Third	6.16	70.09	6.71	53.42	5.99	76.27	6.46	70.87
Fourth	5.79	75.89	6.12	59.55	5.69	81.96	5.83	76.70
Fifth	4.46	80.35	5.48	65.02	4.08	86.04	4.66	81.36
Panel B								
Stock returns								
First	33.95	33.95	27.83	27.83	40.98	40.98	31.71	31.71
Second	10.52	44.46	10.76	38.58	10.77	51.75	11.08	42.79
Third	6.74	51.20	7.32	45.91	7.19	58.95	6.49	49.28
Fourth	5.91	57.11	6.73	52.64	6.08	65.02	6.08	55.36
Fifth	5.62	62.73	6.06	58.70	5.40	70.42	5.45	60.81

Note: the results are calculated using the correlation matrix of daily sovereign CDS spread changes and the correlation matrix of local stock market returns, which are presented in Table B.3 and Table B.4. The full sample period covers dates from 7/1/2004 to 12/31/2017. Pre-, during-, and post-crisis period is defined as 7/1/2004-8/8/2007, 8/9/2007-6/30/2009, and 7/1/2009-12/31/2017, respectively.

Panel A of Table 2.3 shows that, during the full sample period, the first principal component (PC) explains around 50 percent of the variation in EM's sovereign CDS rates, suggesting a considerable amount of commonality in those sovereign CDS rates. The first five PCs explain more than 80 percent of the variation. Looking at the results for the three sub-periods, one can find that the first PC explains about 60 percent of the sovereign CDS rate fluctuations during the crisis period, higher than the share during the pre-crisis and post-crisis sub-periods. This indicates a more substantial commonality in the behavior of EM's sovereign CDS rates during the period of financial turmoil, which could be due to one or several shared influences. Interestingly, the share of variation accounted for by the first PC for the post-crisis sub-period is still considerably higher than that for the pre-crisis sub-period (48% versus 34%). This implies that those shared influences that drove the commonality of EMs sovereign CDS rates during the crisis may still have been at work after the GFC ended.

In contrast, the PCA of local stock market returns shows less commonality for the same group of sample countries (see Panel B of Table 2.3). Over the entire sample period, the first component explains around only 34 percent of the variation in EM's stock market returns, as compared to 51 percent in sovereign CDS rate changes. Similar patterns are found for all three sub-periods.

This study is the first to show the degree of commonality in the behavior of EM's sovereign CDS rate changes and local stock market returns using PCA during the *post-crisis* period. As for the pre- and during- crisis periods, the results are in line with previous studies in the literature. For example, Fender, Hayo, and Neuenkirch (2012) find that sovereign CDS rates are more correlated across 12 EMs than are local

stock market returns. Also, the percentage of variation explained by the first principal component rises substantially during the GFC period (August 2007- December 2011 by their definition). Longstaff et al. (2011) also find similar patterns using monthly CDS quotes on 26 EMs and advanced economies: the first principal component accounts for about 43% (2000-2006) and 75% (2007-2010) of the variation in sovereign CDS rate changes. These numbers are slightly higher than the ones in both my study and Fender, Hayo, and Neuenkirch (2012), which may suggest that common factors are of less significance at a higher daily frequency than monthly frequency.

2.5 Regression Analysis

In this section, I further investigate the sources of commonality of EMs' sovereign CDS rate changes discovered in the PCA. Specifically, I study how the set of local and global drivers described in Section 2.3.2 explain the behavior of EMs' sovereign CDS rate changes before, during, and after the GFC.

2.5.1 Methodology

I formally examine how sovereign CDS rates respond to changes in local and global variables at a daily frequency in my sample panel of 17 EM countries, using the following regression:

$$\Delta(sovereign\ CDS)_{it} = \beta(\boldsymbol{Local})_{it} + \gamma(\boldsymbol{Global})_t + \kappa(day\ of\ the\ week\ effects)_t + \alpha_i + \delta_t + \epsilon_{it} \quad \text{Equation 9}$$

where i and t denote sovereign and time on a daily basis, respectively. $\Delta(sovereign\ CDS)_i$ denotes the daily change in the sovereign CDS rate for country i.

$(\boldsymbol{Local})_i$ is a set of local macroeconomic and financial variables at the country level. It includes (i) daily changes in local stock market returns; (ii) daily percentage changes in the exchange rate of the local currency against the U.S. dollar; and (iii) monthly percentage changes in that country's foreign currency reserves denominated in U.S. dollars.[19] [20] $\boldsymbol{Global}$ is the daily change in a common set of global financial variables. It includes: (i) a list of indicators on U.S. financial markets; (ii) global risk premiums; (iii) global investment flows; (iv) CDS rates of other sovereigns.[21]

I also include "day of the week effects" in the regression to control for the possible nonconstant distributions of financial asset returns across days of the week, an anomaly well documented by the finance literature.[22] The variable consists of a set of step dummies created for each weekday of the week. α_i and δ_t capture country and monthly time fixed effects, respectively. ϵ_{it} is a stochastic error term that captures the effects of other factors that influence the sovereign CDS rate. I correct all standard errors for possible heteroskedasticity and auto-correlation by adopting Newey-West variance estimates.[23]

2.5.2 Discussion of Results

I regress daily changes in sovereign CDS rates on the explanatory variables described in Equation 9 above for the pool of 17 EMs in my sample. Table 2.4 reports the results for the entire sample in Column (1) and for pre-crisis, crisis, and post-crisis sub-

[19] Details about each explanatory variable's definition, frequency, and source of the data are described in Table B.2 in the Appendix.
[20] Variable of foreign currency reserves enters Equation 9 as a monthly measure.
[21] Variables of term premium and global investment flows enter Equation 9 as monthly measures.
[22] See, for example, Fields (1931), Gibbons and Hess (1981), Aggarwal and Rivoli (1989), and Basher and Sadorsky (2006).
[23] Details about the Newey-West standard errors can be found in Newey and West (1987).

samples in Columns (2), (3), and (4), respectively. I use the event of BNP Paribas, France's largest bank, halting redemptions on three hedge funds that specialized in U.S. mortgage debt on August 9, 2007, as the start of the GFC. I use June 30, 2009 as the ending of the GFC. This date is marked by NBER's Business Cycle Dating Committee as the end of the recession and the return to economic growth in the U.S. [24]

Table 2.4: Local and Global Drivers of Changes in Sovereign CDS Rates

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-8/8/2007)	Financial crisis (8/9/2007-6/30/2009)	Post-crisis (7/1/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Local Variables				
Local stock market return	-0.147***	-0.062***	-0.178***	-0.168***
	(-22.45)	(-8.19)	(-13.84)	(-18.12)
Exchange rate	0.266***	0.213***	0.272***	0.264***
	(13.39)	(12.57)	(10.83)	(8.67)
Currency reserve	-0.006	0.022*	-0.020	-0.005
	(-0.90)	(1.79)	(-1.24)	(-0.70)
U.S. Financial Market				
Stock market excess return	-0.042***	0.007	-0.061***	-0.042***
	(-4.61)	(0.51)	(-3.01)	(-4.80)
Treasury yields	-0.002	0.020	-0.021	0.053***
	(-0.17)	(1.54)	(-1.13)	(4.10)
U.S. yield curve slope	0.012	0.003	0.004	-0.032**
	(1.11)	(0.24)	(0.31)	(-2.41)
MOVE volatility index	0.009*	0.006	0.043***	-0.000
	(1.86)	(1.04)	(2.64)	(-0.01)
Investment-grade spread	0.005	0.122***	0.003	0.006
	(0.88)	(5.47)	(0.38)	(0.67)
High-yield spread	0.028***	0.050***	-0.034	0.050***
	(2.93)	(3.88)	(-1.6)	(5.53)
Global Risk Premiums				
Equity premium	-0.055***	-0.041***	-0.050*	-0.041***
	(-5.72)	(-2.92)	(-1.90)	(-4.41)
Volatility premium	0.074***	0.137***	0.057*	0.067***
	(6.58)	(7.12)	(1.96)	(7.56)
Term premium	-0.013*	0.013	-0.005	-0.005
	(-1.68)	(1.08)	(-0.26)	(-0.73)

[24] I verify the robustness of the main results by using other cutoffs of crisis periods in Section 2.5.3.

Table 2.4: Local and Global Drivers of Changes in Sovereign CDS Rates *(Continued)*

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-8/8/2007)	Financial crisis (8/9/2007-6/30/2009)	Post-crisis (7/1/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Global Investment Flows				
Equity flow	-0.006*	0.011	-0.007	-0.007**
	(-1.81)	(1.21)	(-0.20)	(-1.83)
Bond flow	0.020***	-0.047	0.131	0.014***
	(5.34)	(-1.58)	(1.53)	(3.69)
Sovereign CDS Rates				
Global CDS rate	0.054***	0.106***	0.150***	0.025***
	(8.49)	(4.17)	(4.72)	(6.54)
Regional CDS rate	0.033***	0.047***	0.047**	0.016***
	(5.62)	(3.19)	(2.57)	(2.82)
Day of The Week Effects				
Monday	0.008	0.033**	0.050	-0.010
	(0.66)	(2.24)	(1.01)	(-0.75)
Tuesday	-0.029**	-0.019	0.039	-0.052***
	(-2.29)	(-1.25)	(0.73)	(-3.72)
Wednesday	-0.001	-0.008	0.161***	-0.032**
	(-0.06)	(-0.48)	(2.94)	(-2.46)
Thursday	-0.003	-0.017	0.073	-0.015
	(-0.22)	(-1.09)	(1.53)	(-1.07)
Observations	57,672	13,400	8,103	36,169

Note: Dummy for Friday was omitted from regressions because of collinearity; therefore, its results are not reported. Beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" heteroskedastic- and autocorrelation-consistent (HAC) standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

2.5.2.1 Local Variables

Let us first focus on the three local variables. Table 2.4 shows strong evidence that local stock market returns and exchange rates exert a significant impact (at the one-percent level) on EMs' sovereign CDS rates before, during, and after the GFC. The negative coefficients on local stock market returns indicate that an increase in closing stock prices, an indicator for better expectations about future economic activity, lowers sovereign CDS rates. The positive coefficients on exchange rates indicate that an increased exchange rate (i.e., depreciation against the U.S. dollar) makes paying down

dollar-denominated sovereign debt considerably more expensive, thus elevating that EM's sovereign risk.

The coefficient on foreign currency reserves is weakly positive before the GFC and not statistically significant afterward. One reason could be that the impact of foreign currency reserves has already been priced into the exchange rate, a more market-oriented measure. A higher level of foreign currency reserves provides confidence among investors and better supports the currency from any sudden shocks.

Among these three local drivers, the exchange rate has the most influential impact on the pricing of sovereign CDS. For every one-standard deviation increase in the exchange rate, the country's sovereign CDS rate rises by more than 0.2 standard deviations for all three sub-periods.

2.5.2.2 Global Financial Variables

Now let us turn to the global variables. First, the regression results indicate that the impact of U.S. financial market variables on EMs' sovereign CDS rates changes over the three sub-periods. Before the GFC, neither the state of the U.S. stock market nor the Treasury fixed-income market (proxied by Treasury yields, the slope of U.S. yield curve, and the MOVE volatility index) have a significant influence on EMs' sovereign CDS rates.

With the onset of the GFC, however, U.S. stock market performance became vital in explaining variation in EMs' sovereign CDS rates. The negative coefficients in columns (3) and (4) indicate that bad news for the U.S. stock market is also bad news for EMs' sovereign CDS rates. Also, I find that U.S. Treasury yields and the slope of U.S. yield curve play a significant role in the post-crisis period, indicating spillovers

from US monetary policy on EMs sovereign risk. The positive sign of U.S. Treasury yields indicates that higher returns on U.S. Treasury bonds lead to an increase in EMs' sovereign CDS rates, perhaps suggesting that the sovereign bonds of U.S. and EMs are considered as substitutes in investor portfolios after the GFC. The negative coefficient on the slope of U.S. yield curve could be explained by the phenomenon that an "inversion" of the yield curve, in which short-maturity interest rates are higher than long-maturity rates, is typically associated with an imminent recession; and a recession in the U.S. could be transmitted to EMs, thus elevating their sovereign credit risk.

Moreover, the sentiment of the U.S. bond market, as measured by the MOVE volatility index, significantly affects EMs' sovereign credit conditions during the turbulent crisis period. The positive coefficient indicates that rising concerns within the U.S. bond market elevate the sovereign CDS rates in EMs. Once the GFC ends, volatility in the U.S. bond market no longer has a significant impact on EMs' sovereign CDS rates.

My findings above support the "decoupling-recoupling hypothesis" on the transmission of the GFC to EMs. The hypothesis states that EMs were insulated from developments in U.S. financial markets prior to the GFC; with the beginning of the GFC, however, EMs responded strongly to the worsening situation in the U.S. financial system. Dooley and Hutchison (2009) also find similar evidence in support of this hypothesis using an "event study" method.

U.S. corporate bond market conditions, as gauged by the investment-grade spread and high-yield spread, have a significantly positive impact on EM's sovereign CDS rates before the start of the GFC, but not during the GFC. Similar to Treasury

yields, the positive coefficients on these two corporate bond market indicators imply that before the GFC, sovereign debt of EMs and U.S. corporate bonds were considered as substitutes in investor portfolios. During the GFC, this impact is not significant. One reason could be that U.S. equity market conditions became a more dominant influence on EMs' sovereign credit risk than U.S. corporate bond market conditions during the crisis period. In the post-crisis period, the high-yield spread again becomes a significant driver of EMs' sovereign CDS rates, but not the investment-grade spread.

Overall, among all indicators of U.S. Financial Market, the leading driver on the pricing of EMs' sovereign CDS rates changes from the investment-grade spread in the pre-crisis period, to stock market excess returns in the crisis period, to Treasury yields in the post-crisis period. The results highlight the role of the U.S. stock market in EMs' sovereign credit risk during turbulent times and the role of the Fed's monetary policies, e.g. quantitative easing, after the GFC.

Next, the regression results suggest a strong relationship between global risk premiums and EMs' sovereign CDS rates before, during, and after the GFC. The significant negative coefficients on the equity premium variable indicate that a drop in the price-earnings ratio for the S&P 100 stock market index, which includes the largest and most established companies in the S&P 500, leads to an increase in EMs' sovereign CDS rates. The significant positive coefficients on the volatility premium variable indicate that an upswing in the difference between perceived and realized volatility of the U.S. stock market contributes to a rise in EMs' sovereign CDS rates. The coefficients for the term premium are insignificant for all three sub-periods. Among

these three risk premiums, the volatility premium is the most influential for EMs' sovereign CDS rates.

Thirdly, two measures of global investment flows significantly influence EMs' sovereign CDS rates, although only in the post-crisis period. One explanation for the negative coefficient on global equity flows could be that after the GFC, a decline in the market liquidity of equities (caused, for example, by funding shocks to leveraged investors) leads to an increase in EMs' sovereign CDS rates. Longstaff et al. (2011) suggest that this phenomenon could be explained if the marginal investor subject to these funding shocks holds sovereign debt, so that sovereign CDS rates might display a shared liquidity related pattern. On the contrary, global bond inflows push up sovereign CDS rates in EMs, which is consistent with the view that when there is a switch away from risk in market sentiment, investors turn away from EMs' sovereign debt, which is usually considered as a risky asset. The finance literature has acknowledged the role of international mutual funds in transmitting financial shocks in equity and bond markets. For example, Raddatz and Schmukler (2012) argue that mutual funds may trigger asset fire sales during downturns, thus exacerbating the global financial cycle. My finding suggests that this transmission may have a delayed effect on EM's sovereign CDS rates.

Finally, CDS rates of other sovereigns always have a significantly positive impact on an EM's sovereign CDS rates, after controlling for local and common global factors. Not surprisingly, both the global CDS rate, defined as the average CDS rate for all countries outside one's own region, and the regional CDS rate, defined as the average CDS rate for all other countries in that country's region, drive that country's

sovereign CDS rate in the same direction. These measures of average sovereign CDS rates could reflect some common factor(s) that are not captured by other explanatory variables, as suggested by Longstaff et al. (2011).

2.5.3 Decomposition of R-square

In addition to the estimated coefficients on local and global factors, I would also like to determine what share of the residual variance of sovereign CDS rates (after taking out any country and time fixed effects) can be accounted for by the local and different types of global factors. One way to do this is to decompose R-square using the Shapley-Owen Decomposition. Table 2.5 reports the percentage points each group of factors' contributions for three sub-periods. *Local Variables* remains the major contributor to the model variance in the full sample and the number rose noticeably in the post-crisis period. In contrast, the variance contributions of *U.S. Financial Market* and *Sovereign CDS Rates* rose during the crisis period and fell back after the crisis ended.

Table 2.5: R-square Decomposition of Regressors (in percentage points)

Groups of Regressors	Full Sample	Pre-crisis	Crisis	Post-crisis
Local Variables	71.7	54.0	53.8	79.5
U.S. Financial Market	8.9	10.4	11.7	6.6
Global Risk Premiums	12.1	14.9	13.5	7.9
Global Investment Flows	0.2	0.2	0.2	0.3
Sovereign CDS Rates	5.1	6.2	10.8	2.0

2.5.4 Robustness Tests

In this subsection, I demonstrate that my results on the impact of local and global variables on EMs' sovereign CDS rates are robust against different cutoffs of pre-crisis, crisis, and post-crisis sub-periods.

For the main results, I use August 9, 2007 as the starting point of the crisis. This is the date when BNP Paribas, France's largest bank, halted redemptions on three investment funds. Here I test two additional starting dates while keeping the ending date as June 30, 2009. One alternative date is February 27, 2007, when Freddie Mac announced that it would no longer buy the riskiest subprime mortgages and mortgage-related securities. At that point, the GFC was mostly concentrated within the subprime mortgage sector in the U.S. The other alternative date is September 15, 2008, when Lehman Brothers declared bankruptcy. Lehman Brothers' failure seemed to trigger a more widespread financial crisis and a subsequent recession, both within and beyond the U.S. Table 2.6 and Table 2.7 report regression results using February 27, 2007 and September 15, 2008 as the starting point of the GFC, respectively. The results in Column (2) and (3) are both quantitatively and qualitatively similar to the main results reported in Table 2.4.

Similarly, I also check two alternative ending dates while keeping the starting date as August 9, 2007. One alternative date is March 6, 2009, when the Dow Jones industrial average (DJIA) hit its GFC low of 6,469.95. After this date, the DJIA rebounded and made its way back above 10,000 by mid-2010. This date was thus the turning point of the GFC for financial markets and was three months prior to the official ending date of the recession as declared by the NBER.

Table 2.8 reports the results. First, the coefficients for the MOVE volatility index and regional CDS rates are not significant anymore, compared with those reported in Table 2.4. One explanation could be that the strong positive impact of these two variables on EMs' sovereign CDS rates were concentrated in the later phase of the GFC, which is included in the crisis period defined in Table 2.4, but not in Table 2.8. Secondly, the coefficient for the term-premium variable becomes significantly negative in the post-crisis period. The term premium is the excess yield that investors requires as compensation for holding a long-term Treasury bond rather than holding a series of shorter-term bonds. The negative relationship means that when the excess yield rises, EMs' sovereign CDS rates fall. One explanation is that, between March and July 2009, the Federal Reserve made a series of announcements to inject liquidity into the market and maintain the effective federal funds rate at 0 to 0.25 percent for an extended period. In the foreseeable low-interest-rate environment, investors were more willing to roll over their investments in a series of shorter-term bonds, thus requiring an extra yield to induce them to hold a bond for a more extended period. The term premium rises during this time. As a substitute for U.S. Treasury long-term bonds, EM 5-year sovereign bonds became a more desirable asset with higher returns. Therefore, investors required less compensation for default risk to hold the EM sovereign bonds, and CDS rates fell as a result.

The second alternative ending date is January 31, 2010, which is the end of the sample period used in Longstaff et al. (2011). Table 2.9 reports the results. They are quantitatively and qualitatively very similar to those in Columns (3) and (4) of Table 2.4. It is also interesting to compare Columns (2) and (3) of Table 2.9 to the main

regression results in Table 3 of Longstaff et al. (2011), since they cover about the same sample period. Longstaff et al. (2011) find that the U.S. stock market return and the U.S. high-yield spread are the most influential financial market variables. However, when I break the period into two parts, before and during the GFC, a different picture reveals itself. The U.S. stock market only has a significant impact on EMs' sovereign CDS rates during the GFC, not before the GFC, and the U.S. high-yield spread only has a significant impact before the GFC, not during the GFC. The result demonstrates one of my paper's contributions, which is to reveal the changing effect of global factors by dividing the sample period into distinct parts.

Table 2.6: Results - Freddie Mac Press Release as Beginning of the GFC

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-2/26/2007)	Financial crisis (2/27/2007-6/30/2009)	Post-crisis (7/1/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Local Variables				
Local stock market return	-0.147***	-0.057***	-0.169***	-0.168***
	(-22.45)	(-7.26)	(-14.17)	(-18.12)
Exchange rate	0.266***	0.201***	0.276***	0.264***
	(13.39)	(11.44)	(11.48)	(8.67)
Currency reserve	-0.006	0.009	-0.006	-0.005
	(-0.90)	(0.90)	(-0.43)	(-0.70)
U.S. Financial Market				
Stock market excess return	-0.042***	0.015	-0.060***	-0.042***
	(-4.61)	(1.06)	(-3.12)	(-4.80)
Treasury yields	-0.002	0.043***	-0.027	0.053***
	(-0.17)	(3.40)	(-1.51)	(4.10)
U.S. yield curve slope	0.012	-0.011	0.005	-0.032**
	(1.11)	(0.80)	(0.40)	(-2.41)
MOVE volatility index	0.009*	0.004	0.035***	-0.000
	(1.86)	(0.58)	(2.67)	(-0.01)
Investment-grade spread	0.005	0.099***	0.003	0.006
	(0.88)	(4.71)	(0.50)	(0.67)
High-yield spread	0.028***	0.047***	-0.034	0.050***
	(2.93)	(3.59)	(-1.42)	(5.53)
Global Risk Premiums				
Equity premium	-0.055***	-0.054***	-0.051**	-0.041***
	(-5.72)	(-3.41)	(-2.05)	(-4.41)
Volatility premium	0.074***	0.127***	0.057**	0.067***
	(6.58)	(5.86)	(2.13)	(7.56)
Term premium	-0.013*	0.013	-0.006	-0.005
	(-1.68)	(0.73)	(-0.38)	(-0.73)

Table 2.6: Results - Freddie Mac Press Release as Beginning of the GFC *(Continued)*

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-2/26/2007)	Financial crisis (2/27/2007-6/30/2009)	Post-crisis (7/1/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Global Investment Flows				
Equity flow	-0.006*	-0.007	-0.030	-0.007**
	(-1.81)	(-0.81)	(-0.94)	(-1.83)
Bond flow	0.020***	-0.022	0.114	0.014***
	(5.34)	(-0.78)	(1.40)	(3.69)
Sovereign CDS Rates				
Global CDS rate	0.054***	0.097***	0.151***	0.025***
	(8.49)	(3.96)	(4.92)	(6.54)
Regional CDS rate	0.033***	0.058***	0.047***	0.016***
	(5.62)	(4.24)	(2.64)	(2.82)
Day of The Week Effects				
Monday	0.008	0.034**	0.040	-0.010
	(0.66)	(2.10)	(1.01)	(-0.75)
Tuesday	-0.029**	-0.007	-0.001	-0.052***
	(-2.29)	(-0.42)	(-0.02)	(-3.72)
Wednesday	-0.001	-0.006	0.113**	-0.032**
	(-0.06)	(-0.36)	(2.54)	(-2.46)
Thursday	-0.003	-0.003	0.046	-0.015
	(-0.22)	(-0.17)	(1.16)	(-1.07)
Observations	57,672	11,459	10,044	36,169

Note: Dummy for Friday was omitted from regressions because of collinearity; therefore, its results are not reported. Beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 2.7: Results - Lehman Brothers Filing Bankruptcy as Beginning of the GFC

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-9/14/2008)	Financial crisis (9/15/2008-6/30/2009)	Post-crisis (7/1/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Local Variables				
Local stock market return	-0.147***	-0.090***	-0.196***	-0.168***
	(-22.45)	(-12.68)	(-10.38)	(-18.12)
Exchange rate	0.266***	0.213***	0.281***	0.264***
	(13.39)	(15.85)	(8.01)	(8.67)
Currency reserve	-0.006	-0.002	0.039	-0.005
	(-0.90)	(-0.17)	(0.09)	(-0.70)
U.S. Financial Market				
Stock market excess return	-0.042***	0.006	-0.071***	-0.042***
	(-4.61)	(0.58)	(-2.74)	(-4.80)
Treasury yields	-0.002	-0.011	0.009	0.053***
	(-0.17)	(-1.40)	(0.27)	(4.10)
U.S. yield curve slope	0.012	0.018***	-0.029	-0.032**
	(1.11)	(3.34)	(-0.99)	(-2.41)
MOVE volatility index	0.009*	-0.003	0.107***	-0.000
	(1.86)	(-0.53)	(3.50)	(-0.01)
Investment-grade spread	0.005	0.118***	-0.004	0.006
	(0.88)	(6.98)	(-0.59)	(0.67)
High-yield spread	0.028***	0.034***	-0.043	0.050***
	(2.93)	(3.50)	(-1.27)	(5.53)
Global Risk Premiums				
Equity premium	-0.055***	-0.062***	-0.044	-0.041***
	(-5.72)	(-5.27)	(-1.05)	(-4.41)
Volatility premium	0.074***	0.106***	0.076**	0.067***
	(6.58)	(7.71)	(2.01)	(7.56)
Term premium	-0.013*	0.007	0.042	-0.005
	(-1.68)	(0.78)	(0.34)	(-0.73)

Table 2.7: Results - Lehman Brothers Filing Bankruptcy as Beginning of the GFC
(Continued)

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-9/14/2008)	Financial crisis (9/15/2008-6/30/2009)	Post-crisis (7/1/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Global Investment Flows				
Equity flow	-0.006*	0.017**	0.717	-0.007**
	(-1.81)	(2.16)	(0.75)	(-1.83)
Bond flow	0.020***	-0.042	0.745	0.014***
	(5.34)	(-1.46)	(0.47)	(3.69)
Sovereign CDS Rates				
Global CDS rate	0.054***	0.120***	0.134***	0.025***
	(8.49)	(5.51)	(3.76)	(6.54)
Regional CDS rate	0.033***	0.024*	0.044**	0.016***
	(5.62)	(1.82)	(2.06)	(2.82)
Day of The Week Effects				
Monday	0.008	0.011	0.143	-0.010
	(0.66)	(0.83)	(1.37)	(-0.75)
Tuesday	-0.029**	-0.014	0.066	-0.052***
	(-2.29)	(-0.93)	(0.58)	(-3.72)
Wednesday	-0.001	-0.015	0.414***	-0.032**
	(-0.06)	(-1.02)	(3.37)	(-2.46)
Thursday	-0.003	0.004	0.092	-0.015
	(-0.22)	(0.30)	(0.86)	(-1.07)
Observations	57,672	18,118	3,385	36,169

Note: Dummy for Friday was omitted from regressions because of collinearity; therefore, its results are not reported. Beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 2.8: Results - Dow Jones Lowest as Ending of the GFC

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-8/8/2007)	Financial crisis (8/9/2007-3/6/2009)	Post-crisis (3/7/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Local Variables				
Local stock market return	-0.147***	-0.062***	-0.175***	-0.172***
	(-22.45)	(-8.19)	(-12.25)	(-18.81)
Exchange rate	0.266***	0.213***	0.251***	0.272***
	(13.39)	(12.57)	(8.96)	(9.25)
Currency reserve	-0.006	0.022*	-0.012	-0.003
	(-0.90)	(1.79)	(-0.72)	(-0.41)
U.S. Financial Market				
Stock market excess return	-0.042***	0.007	-0.083***	-0.045***
	(-4.61)	(0.51)	(-3.26)	(-5.17)
Treasury yields	-0.002	0.020	-0.038*	0.059***
	(-0.17)	(1.54)	(-1.91)	(4.58)
U.S. yield curve slope	0.012	0.003	0.001	-0.029**
	(1.11)	(0.24)	(0.06)	(-2.17)
MOVE volatility index	0.009*	0.006	0.020	0.002
	(1.86)	(1.04)	(1.13)	(0.30)
Investment-grade spread	0.005	0.122***	0.016	-0.005
	(0.88)	(5.47)	(1.48)	(-0.74)
High-yield spread	0.028***	0.050***	-0.025	0.048***
	(2.93)	(3.88)	(-0.94)	(5.26)
Global Risk Premiums				
Equity premium	-0.055***	-0.041***	-0.003	-0.058***
	(-5.72)	(-2.92)	(-0.12)	(-5.37)
Volatility premium	0.074***	0.137***	0.050	0.064***
	(6.58)	(7.12)	(1.46)	(7.07)
Term premium	-0.013*	0.013	-0.002	-0.024***
	(-1.68)	(1.08)	(-0.08)	(-3.46)

Table 2.8: Results - Dow Jones Hitting Lowest Level as Ending of the GFC
(Continued)

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-8/8/2007)	Financial crisis (8/9/2007-3/6/2009)	Post-crisis (3/7/2009-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Global Investment Flows				
Equity flow	-0.006*	0.011	0.087**	-0.008**
	(-1.81)	(1.21)	(2.32)	(-2.15)
Bond flow	0.020***	-0.047	0.121	0.015***
	(5.34)	(-1.58)	(1.20)	(4.13)
Sovereign CDS Rates				
Global CDS rate	0.054***	0.106***	0.203***	0.027***
	(8.49)	(4.17)	(4.80)	(6.52)
Regional CDS rate	0.033***	0.047***	0.027	0.021***
	(5.62)	(3.19)	(1.18)	(3.73)
Day of The Week Effects				
Monday	0.008	0.033**	-0.032	0.006
	(0.66)	(2.24)	(-0.62)	(0.40)
Tuesday	-0.029**	-0.019	0.027	-0.047***
	(-2.29)	(-1.25)	(0.45)	(-3.35)
Wednesday	-0.001	-0.008	0.154**	-0.026**
	(-0.06)	(-0.48)	(2.54)	(-2.02)
Thursday	-0.003	-0.117	0.129**	-0.021
	(-0.22)	(-1.09)	(2.38)	(-1.50)
Observations	57,672	13,400	6,747	37,525

Note: Dummy for Friday was omitted from regressions because of collinearity; therefore, its results are not reported. Beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 2.9: Results - January 31, 2010 as Ending of the GFC

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-8/8/2007)	Financial crisis (8/9/2007-1/31/2010)	Post-crisis (2/1/2010-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Local Variables				
Local stock market return	-0.147***	-0.062***	-0.169***	-0.177***
	(-22.45)	(-8.19)	(-14.76)	(-18.16)
Exchange rate	0.266***	0.213***	0.280***	0.259***
	(13.39)	(12.57)	(12.53)	(8.19)
Currency reserve	-0.006	0.022*	-0.023	-0.009
	(-0.90)	(1.79)	(-1.59)	(-1.28)
U.S. Financial Market				
Stock market excess return	-0.042***	0.007	-0.075***	-0.025***
	(-4.61)	(0.51)	(-4.45)	(-2.69)
Treasury yields	-0.002	0.020	-0.018	0.058***
	(-0.17)	(1.54)	(-1.10)	(4.30)
U.S. yield curve slope	0.012	0.003	0.007	-0.037***
	(1.11)	(0.24)	(0.57)	(-2.69)
MOVE volatility index	0.009*	0.006	0.032**	0.001
	(1.86)	(1.04)	(2.24)	(0.14)
Investment-grade spread	0.005	0.122***	0.002	-0.002
	(0.88)	(5.47)	(0.37)	(-0.14)
High-yield spread	0.028***	0.050***	-0.015	0.034***
	(2.93)	(3.88)	(-0.69)	(3.45)
Global Risk Premiums				
Equity premium	-0.055***	-0.041***	-0.021	-0.092***
	(-5.72)	(-2.92)	(-1.62)	(-8.58)
Volatility premium	0.074***	0.137***	0.057**	0.058***
	(6.58)	(7.12)	(2.23)	(6.24)
Term premium	-0.013*	0.013	-0.001	-0.010
	(-1.68)	(1.08)	(-0.04)	(-1.50)

Table 2.9: Results - January 31, 2010 as Ending of the GFC *(Continued)*

Dependent variable: $\Delta(sovereign\ CDS)_{it}$

	Full Sample (7/1/2004-12/31/2017)	Pre-crisis (7/1/2004-8/8/2007)	Financial crisis (8/9/2007-1/31/2010)	Post-crisis (2/1/2010-12/31/2017)
Independent variable	(1)	(2)	(3)	(4)
Global Investment Flows				
Equity flow	-0.006*	0.011	-0.011	-0.008**
	(-1.81)	(1.21)	(-0.37)	(-2.07)
Bond flow	0.020***	-0.047	0.099	0.015***
	(5.34)	(-1.58)	(1.35)	(4.10)
Sovereign CDS Rates				
Global CDS rate	0.054***	0.106***	0.153***	0.021***
	(8.49)	(4.17)	(5.25)	(5.67)
Regional CDS rate	0.033***	0.047***	0.050***	0.012**
	(5.62)	(3.19)	(3.06)	(2.14)
Day of The Week Effects				
Monday	0.008	0.033**	-0.006	0.001
	(0.66)	(2.24)	(-0.16)	(0.06)
Tuesday	-0.029**	-0.019	0.000	-0.042***
	(-2.29)	(-1.25)	(0.01)	(-2.88)
Wednesday	-0.001	-0.008	0.136***	-0.036**
	(-0.06)	(-0.48)	(3.19)	(-2.72)
Thursday	-0.003	-0.017	0.050	-0.018
	(-0.22)	(-1.09)	(1.32)	(-1.21)
Observations	57,672	13,400	10,625	33,647

Note: Dummy for Friday was omitted from regressions because of collinearity; therefore, its results are not reported. Beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

2.6 Conclusion

I study the drivers of daily sovereign CDS rates for a group of emerging markets before, during, and after the 2007-2009 Global Financial Crisis. Specifically, I use principal component analysis and panel regressions estimated over the periods July 2004-August 2007, August 2007-June 2009, and July 2009-December 2017 to establish the evolving impact of potential local and global determinants on sovereign CDS rates. The analysis

is the first to provide insights into sovereign CDS dynamics during the post-crisis period.

The principal component analysis shows that EMs' sovereign CDS rates tend to be more correlated across countries than are local stock market returns for the same countries. Also, the level of commonality in EMs' sovereign CDS rates increased substantially during the crisis period and remained at a high level after the crisis ends. The regression analysis provides two main findings. First, two local factors, stock market returns and the exchange rate against the U.S. dollar, have significant explanatory power for that country's sovereign CDS rate in the pre-crisis, crisis, and post-crisis periods. Second, EMs' sovereign CDS rates are significantly related to global factors during the crisis period and the post-crisis period. The global factors can be grouped into four categories (U.S. financial market, global risk premium, global investment flows, and CDS rates of other sovereigns). However, the relative strength of variables within each category vary over time. When designing monetary policies and investment strategies, policymakers and investors in EMs should not only keep an eye on local fundamentals but also the global factors found to be influential in this paper.

A Appendix for Chapter 1

Table A.1: Emerging Markets Sovereign Defaults (1999-2016)

Date	**Country**
May 25, 1999	Russia
October 22, 1999	Ecuador
February 25, 2009	Pakistan
March 21, 2000	Cote d'Ivoire
November 30, 2011	Argentina
June 13, 2002	Moldova
May 3, 2003	Uruguay
December 30, 2004	Grenada
April 20, 2005	Dominican Republic
December 7, 2006	Belize
October 23, 2008	Seychelles
December 16, 2008	Ecuador
January 31, 2011	Cote d'Ivoire
September 20, 2012	Belize
March 15, 2013	Grenada
July 30, 2014	Argentina
September 23, 2015	Ukraine

Table A.2: List of Corporates in the Sample

Firm	Headquarter	Sector	% of Direct State Ownership	% of Ultimate State Ownership	No. of Events	Total Assets/Country's GDP (%)
Ambev	Brazil	Consumer Goods	0.0	0.0	88	1.2
Braskem	Brazil	Basic Materials	0.0	28.3	236	0.8
CSN	Brazil	Basic Materials	0.0	0.0	147	0.7
Embraer	Brazil	Industrials	0.0	50.1	174	0.6
Gerdau	Brazil	Basic Materials	0.0	0.0	138	0.9
JBS	Brazil	Consumer Goods	0.0	0.0	308	1.5
Petrobras	Brazil	Energy	60.1	60.1	617	12.4
Usiminas	Brazil	Basic Materials	0.0	0.0	98	0.4
Vale	Brazil	Basic Materials	6.5	50.1	434	4.7
Arauco	Chile	Basic Materials	0.0	0.0	52	5.5
CAP	Chile	Basic Materials	0.0	0.0	33	2.3
Codelco	Chile	Basic Materials	100.0	100.0	162	13.5
ENAP	Chile	Energy	100.0	100.0	107	2.2
Enel Generacion Chile	Chile	Utilities	0.0	0.0	86	3.6
Sociedad Química y Minera	Chile	Basic Materials	0.0	0.0	51	1.8
Transelec	Chile	Energy	0.0	0.0	26	1.5
China Comms. Construction	China	Industrials	88.0	88.0	37	1.0
China Mobile	China	Telecommunications	72.7	72.7	67	1.9
China Resources Enterprise	China	Industrials	51.9	51.9	98	0.2
China Unicom HK	China	Telecommunications	33.8	33.8	110	0.8

CITIC Pacific	China	Industrials	58.0	58.0	163	7.9
CNOOC	China	Energy	64.4	64.4	128	0.9
Sinopec	China	Energy	75.8	75.8	381	2.0
Genting	Malaysia	Consumer Services	0.0	0.0	188	6.6
IOI Corporation	Malaysia	Consumer Goods	0.0	0.0	69	1.3
MISC	Malaysia	Industrials	65.0	73.8	75	3.8
Petronas	Malaysia	Energy	100.0	100.0	164	44.5
Telekom Malaysia	Malaysia	Telecommunications	28.0	28.0	133	1.9
Tenaga Nasional	Malaysia	Utilities	41.8	41.8	218	10.2
YTL Corp	Malaysia	Utilities	0.0	0.0	10	5.7
América Móvil	Mexico	Telecommunications	0.0	0.0	305	6.2
Cemex	Mexico	Consumer Goods	0.0	0.0	125	2.6
Federal Electricity Commission	Mexico	Utilities	100.0	100.0	131	6.3
Grupo Bimbo	Mexico	Consumer Goods	0.0	0.0	17	1.0
Grupo Televisa	Mexico	Telecommunications	0.0	0.0	80	1.2
Pemex	Mexico	Energy	100.0	100.0	408	9.9
Telefonos De Mexico	Mexico	Telecommunications	0.0	0.0	38	0.5
JG Summit Holdings	Philippines	Consumer Services	0.0	0.0	40	4.2
National Power Corporation	Philippines	Utilities	100.0	100.0	30	0.3
PLDT	Philippines	Telecommunications	0.0	0.0	230	3.0
San Miguel Corporation	Philippines	Utilities	0.0	0.0	105	8.6
Alrosa	Russia	Basic Materials	44.0	77.0	247	0.4
Gazprom	Russia	Energy	38.4	50.2	713	16.4

Gazprom Neft	Russia	Energy	0.0	48.1	274	2.4
Russian Railways	Russia	Industrials	100.0	100.0	500	6.6
Lukoil	Russia	Energy	0.0	0.0	413	5.6
Mobile Telesystems	Russia	Telecommunications	0.0	0.0	274	0.6
Rosneft	Russia	Energy	50.1	50.1	646	9.8
Severstal	Russia	Basic Materials	0.0	0.0	256	0.4
Sistema	Russia	Telecommunications	0.0	0.0	272	1.2
Transneft	Russia	Energy	100.0	100.0	367	2.6
AngloGold Ashanti	South Africa	Basic Materials	0.0	0.0	177	2.4
Eskom Holdings	South Africa	Utilities	100.0	100.0	152	14.4
Sappi	South Africa	Basic Materials	0.0	0.0	48	1.6
Sasol	South Africa	Energy	12.3	25.8	124	8.2
Transnet	South Africa	Industrials	100.0	100.0	44	8.9
PTT Global Chemical	Thailand	Basic Materials	0.0	25.9	98	2.8
PTT Exploration & Production	Thailand	Energy	0.0	34.8	125	5.0
PTT Public Company	Thailand	Energy	51.1	52.5	115	14.4
Thai Oil	Thailand	Energy	0.0	26.1	47	1.4
True Company	Thailand	Telecommunications	0.0	0.0	35	2.2

Note: last column reports each corporation's total assets as a share of its headquarter's GDP, average of 2014 to 2016. Data on corporations' total assets are from Worldscope and corporations' websites. Data on countries' GDP are from the World Bank's World Development Indicators.

Table A.3: List of Banks in the Sample

Bank	Headquarter	% of Direct State Ownership
Banco BMG	Brazil	0.0
Banco Bradesco	Brazil	0.0
Banco Do Brasil	Brazil	96.9
Banco Panamericano	Brazil	0.0
Banco Votorantim	Brazil	0.0
Itaú Unibanco	Brazil	0.0
Banco de Chile	Chile	0.0
Banco Santander - Chile	Chile	0.0
Agricultural Bank of China	China	79.2
Bank of China	China	67.6
Bank of Communications	China	26.5
China CITIC Bank International (CNCBI)	China	0.0
China Construction Bank	China	57.0
China Everbright Bank	China	22.0
China Merchants Bank	China	12.4
Industrial and Commercial Bank of China	China	70.7
Shanghai Pudong Development Bank	China	0.0
AmBank	Malaysia	0.0
CIMB Bank Malaysia	Malaysia	28.1
Hong Leong Bank	Malaysia	0.0
Malayan Banking Berhad (Maybank)	Malaysia	0.0
Public Bank Berhad	Malaysia	0.0
RHB Bank Berhad	Malaysia	0.0
BBVA Bancomer	Mexico	0.0
Banco Mercantil del Norte	Mexico	0.0
Nacional Financiera	Mexico	0.0
BDO Unibank	Philippines	0.0
Land Bank of the Philippines	Philippines	100.0
Metropolitan Bank and Trust Company	Philippines	0.0
Rizal Commercial Banking Corporation	Philippines	0.0
Alfa-Bank	Russia	0.0
Bank of Moscow	Russia	44.0
Bank Otkritie Financial Corporation	Russia	0.0
Gazprombank	Russia	0.0
Home Credit and Finance Bank	Russia	0.0
MDM Bank	Russia	0.0
Promsvyazbank	Russia	0.0
Russian Agricultural Bank	Russia	100.0
Russian Standard Bank	Russia	0.0
Sberbank of Russia	Russia	57.6

TransCreditBank	Russia	0.0
Uralsib Bank	Russia	0.0
Vnesheconombank (VEB)	Russia	100.0
VTB Bank	Russia	80.5
Zenit Bank	Russia	0.0
FirstRand Bank	South Africa	0.0
Standard Bank of South Africa	South Africa	0.0
Bangkok Bank	Thailand	0.0
Export-Import Bank of Thailand	Thailand	100.0
Kasikornbank	Thailand	0.0
Krung Thai Bank	Thailand	55.1
Siam Commercial Bank	Thailand	23.7
TMB Bank	Thailand	26.1

Table A.4: Summary Statistics for High-frequency Event-study Analysis, All Dates

	Obs.	Mean	St. Dev.	Min.	Median	Max.	Skew.	Kurt.
Whole Sample								
$\Delta Log(corporate\ CDS)$	35734	-0.002	0.041	-1.716	-0.001	0.832	-4.728	171.3
$\Delta Log(sovereign\ CDS)$	35734	0.003	0.030	-0.210	0.002	0.192	0.129	5.977
$\Delta Log(stock\ index)$	29743	0.000	0.015	-0.112	0.000	0.129	0.100	9.523
$\Delta Log(commodity\ price)$	35734	-0.001	0.029	-0.847	0.000	0.747	-3.749	160.0
$\Delta Log(exchange\ rate)$	35734	0.000	0.010	-0.129	0.000	0.147	0.422	27.04
Brazil								
$\Delta Log(corporate\ CDS)$	5451	-0.003	0.049	-0.955	-0.001	0.832	-4.828	129.7
$\Delta Log(sovereign\ CDS)$	5451	0.003	0.031	-0.133	0.003	0.138	0.069	5.135
Chile								
$\Delta Log(corporate\ CDS)$	3814	-0.002	0.025	-0.455	-0.000	0.348	-4.994	125.3
$\Delta Log(sovereign\ CDS)$	3814	0.006	0.032	-0.152	0.005	0.160	-0.023	5.775
China								
$\Delta Log(corporate\ CDS)$	3654	-0.003	0.048	-1.716	-0.000	0.677	-12.61	466.1
$\Delta Log(sovereign\ CDS)$	3654	0.004	0.024	-0.079	0.003	0.116	0.418	4.630
Malaysia								
$\Delta Log(corporate\ CDS)$	4282	-0.001	0.030	-0.133	-0.003	0.185	0.805	6.292
$\Delta Log(sovereign\ CDS)$	4282	0.002	0.029	-0.096	0.000	0.162	0.462	5.040
Mexico								
$\Delta Log(corporate\ CDS)$	4497	-0.001	0.029	-0.640	-0.001	0.214	-3.278	77.06
$\Delta Log(sovereign\ CDS)$	4497	0.003	0.033	-0.210	0.002	0.147	-0.200	6.471
Philippines								
$\Delta Log(corporate\ CDS)$	1852	-0.010	0.086	-0.503	-0.002	0.573	-0.821	18.03
$\Delta Log(sovereign\ CDS)$	1852	0.003	0.024	-0.092	0.002	0.096	0.306	4.213
Russia								
$\Delta Log(corporate\ CDS)$	6279	-0.001	0.030	-0.462	-0.000	0.410	-0.065	29.86
$\Delta Log(sovereign\ CDS)$	6279	0.002	0.035	-0.163	0.004	0.192	0.088	5.618
South Africa								
$\Delta Log(corporate\ CDS)$	2946	-0.003	0.044	-0.817	-0.001	0.519	-5.507	110.3
$\Delta Log(sovereign\ CDS)$	2946	0.003	0.025	-0.116	0.002	0.150	0.337	5.616
Thailand								
$\Delta Log(corporate\ CDS)$	2959	-0.003	0.029	-0.218	-0.000	0.257	0.038	13.74
$\Delta Log(sovereign\ CDS)$	2959	0.002	0.023	-0.073	0.001	0.125	0.723	6.252

Note: CDS data cover all trading dates from 1/1/2014 to 12/29/2016. $\Delta Log(corporate\ CDS)$ and $\Delta Log(sovereign\ CDS)$ are the daily log change in corporate CDS rates and sovereign CDS rates, respectively. $\Delta Log(stock\ index)$ is the daily log change in the close price of a country's major stock index. $\Delta Log(commodity\ price)$ is the daily log change in the relevant commodity price associated with each corporation. $\Delta Log(exchange\ rate)$ is the daily log change in the country's foreign exchange rate against the US dollar.

Source: CDS data are from Markit. Stock index data are from Bloomberg. Commodity prices and exchange rates are from Thomas Reuters Datastream.

Table A.5: Selected Government Bailout/Guarantee of SOEs

Country	Company	Year	Detail
Brazil	Petrobras	2016	Brazilian President Dilma Rousse said her government is willing to bailout Petrobras, the state-run oil company if the oil prices continue to decline.
Chile	Codelco	2016	Chilean government announced a capital injection of USD975 million for the company in December 2016.
Chile	ENAP	2013	Chilean government approved a payment of up to USD60 million in 2013. Past government support included "a temporary capitalization of retained earnings at ENAPs subsidiaries in both 2008 and 2009, temporary suspension of tax payments in 2009, capitalization of profits between 2009 and 2011, and a USD250 million equity injection in 2008".[25]
China	BOC, CBC	2004	China announced a USD45 billion bailout of 2 state-owned Banks, intending to help control fraud and limit bad loans.
Malaysia	Malaysian Airline	2014	The nation's state investment firm, which controls nearly 70% of Malaysian Airline, disclosed a USD430 million plan to restore the airline's financial strength.
Malaysia	Felda	2019	Malaysia announced an RM6.23 billion financial aid for state-owned national land development agency Felda to revive the indebted organization.
Mexico	Pemex	2016	Years of losses have left Pemex with substantial unfunded pension liabilities and on the hook for billions to suppliers. The Mexican government had to come to the rescue with USD4.4 billion in aid.
Mexico	Pemex	2019	Mexico injected USD3.9 billion into ailing Pemex, promising to strengthen its finances and prevent a further credit downgrade.
Russia	Russian Railways	2016	Government support for Russian Railways from all budgets totaled RUB 94.9 billion in 2016, including federal budget subsidies of RUB 93.6 billion.
South Africa	Eskom	2019	South Africa's government brought forward the bailout of Eskom after the company rushed 5 billion rand (USD355 million) to the struggling utility earlier to avert a default and said more cash could be needed soon.

Source: major news outlets, reports from credit rating agencies, and companies' websites.

[25] See Fitch's report.

Table A.6: Summary Statistics for "Government Dependent" Variable

	Obs.	Mean	St. Dev.	Min.	Median	Max.
Brazil	17	0.042	0.020	0.012	0.038	0.095
Chile	17	0.028	0.017	0.000	0.028	0.054
China	17	0.024	0.008	0.011	0.025	0.041
Malaysia	17	0.012	0.007	0.004	0.012	0.032
Mexico	17	0.057	0.035	0.014	0.046	0.131
Philippines	17	0.036	0.019	0.000	0.036	0.071
Russia	17	0.049	0.018	0.022	0.048	0.088
South Africa	17	0.044	0.027	0.000	0.043	0.106
Thailand	17	0.030	0.018	0.008	0.022	0.067

Note: the "Government Dependent" variable at the sector level is the number of news articles having "Government Contracts" or "Regulation/Government Policy" as a topic, as a percentage of the total news articles for that sector.
Source: Factiva and the author's calculation.

Table A.7: Government Dependent Sectors

Country	**Sector**	**Country**	**Sector**
Brazil	Health Care/Life Sciences	Chile	Real Estate/Construction
	Business/Consumer Services		Health Care/Life Sciences
	Technology		Leisure/Arts/Hospitality
	Media/Entertainment		Technology
China	Financial Services	Malaysia	Financial Services
	Automotive		Energy
	Telecommunication Services		Media/Entertainment
	Agriculture		Business/Consumer Services
Mexico	Health Care/Life Sciences	Philippines	Industrial Goods
	Media/Entertainment		Utilities
	Telecommunication Services		Automotive
	Technology		Business/Consumer Services
Russia	Health Care/Life Sciences	South Africa	Telecommunication Services
	Media/Entertainment		Automotive
	Technology		Consumer Goods
	Utilities		Transportation/Logistics
Thailand	Agriculture		
	Media/Entertainment		
	Consumer Goods		
	Technology		

Source: Factiva and the author's calculation.

Table A.8: Summary Statistics for Financial-development Measures

	Obs.	Mean	St. Dev.	Min.	Median	Max.
DEP	27	1.182	0.722	0.244	0.994	2.758
CRE	24	0.787	0.183	0.440	0.823	0.980

Note: DEP is the ratio of the aggregate value of all bank deposits extended by banks to the private sector to the country's stock market capitalization. *CRE* is the ratio of bank credit to the private non-financial sector to total credit to the private non-financial sector.
Source: World Bank, BIS, and the author's calculation.

Table A.9: High-frequency Event-study Analysis - Financial Development

Dependent variable: $\Delta Log(sovereign\ CDS)_{jt}$

	Financial Development Country-level			
Independent variable	(1)	(2)	(3)	(4)
$\Delta Log(corporate\ CDS)_{ijt}$	0.630***	0.637***	1.067***	1.078***
	(5.43)	(5.61)	(3.28)	(3.28)
$DEP_j \cdot \Delta Log(corporate\ CDS)_{ijt}$	-0.178**	-0.182**		
	(-2.32)	(-2.41)		
$CRE_j \cdot \Delta Log(corporate\ CDS)_{ijt}$			-0.917***	-0.933***
			(-2.80)	(-2.81)
$\Delta Log(stock\ index)_{jt}$	-0.501***	-0.508***	-0.498***	-0.504***
	(-18.56)	(-18.94)	(-13.72)	(-14.16)
$\Delta Log(commodity\ price)_{jt}$	-0.088***	-0.088***	-0.086***	-0.086***
	(-6.22)	(-6.18)	(-5.47)	(-5.42)
$\Delta Log(exchange\ rate)_{jt}$	0.255***	0.252***	0.257***	0.254***
	(8.29)	(8.36)	(6.75)	(6.74)
Country/Sector FE	N	Y	N	Y
Time FE	Y	Y	Y	Y
Observations	8,988	8,988	8,753	8,753

Note: columns (1) and (2) report results where corporate CDS interacts with *DEP*, the ratio of the aggregate value of all bank deposits extended by banks to the private sector to the country's stock market capitalization. Columns (3) and (4) report results where corporate CDS interacts with *CRE*, the share of bank credit in total credit to the private non-financial sector. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.10: Alternative Specification with NEWS Dummy and Three Channels

Dependent variable: $Log(sovereign\ CDS)_{ij,t}$

Independent variable	(1)	(2)
$Log(corporate\ CDS)_{ij,t}$	0.231***	0.232***
	(5.83)	(5.84)
$Log(bank\ CDS)_{j,t}$	0.164***	0.164***
	(15.88)	(15.95)
$NEWS \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.105***	0.104***
	(17.34)	(17.32)
$SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.061***	0.060***
	(2.65)	(2.63)
$GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$	0.011	0.011
	(0.58)	(0.60)
$ASST_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.171***	0.172***
	(3.64)	(3.70)
$LIAB_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.002	0.000
	(0.05)	(0.00)
$TAX_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	-0.009	-0.008
	(-0.20)	(-0.19)
$BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt}$	0.014*	0.013
	(1.89)	(1.87)
$NEWS \cdot SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.033***	0.033***
	(3.70)	(3.70)
$NEWS \cdot GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$	-0.004	-0.004
	(-0.25)	(-0.26)
$NEWS \cdot ASST_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.050	0.048
	(1.48)	(1.44)
$NEWS \cdot LIAB_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.033	0.034
	(1.03)	(1.08)
$NEWS \cdot TAX_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	-0.031	-0.032
	(-0.87)	(-0.90)
$NEWS \cdot BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt}$	-0.001	-0.001
	(-0.18)	(-0.14)
Controls not reported		
Country/Sector FE	N	Y
Time FE	Y	Y
Observations	26,036	26,036

Note: standard beta coefficients are reported. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.11: Two-day Event Window Results – Fiscal Channel

Dependent variable: $Log(sovereign\ CDS)_{ij,t} - Log(sovereign\ CDS)_{ij,t-2}$

	State Ownership		Gov. Dependence	
	one-day window	two-day window	one-day window	two-day window
Independent variable	(1)	(2)	(3)	(4)
$Log(corporate\ CDS)_{iqj,t} - Log(corporate\ CDS)_{iqj,t-2}$	0.268***	0.281***	0.288***	0.302***
	(4.60)	(4.31)	(4.68)	(4.50)
$SOE_i \cdot [Log(corporate\ CDS)_{iqj,t} - Log(corporate\ CDS)_{iqj,t-2}]$	0.352***	0.447***		
	(3.55)	(5.39)		
$GOV_{qj} \cdot [Log(corporate\ CDS)_{iqj,t} - Log(corporate\ CDS)_{iqj,t-2}]$			0.304**	0.446***
			(2.15)	(5.49)
$Log(stock\ index)_{j,t} - Log(stock\ index)_{j,t-2}$	-0.508***	-0.552***	-0.508***	-0.557***
	(-18.06)	(-17.09)	(-16.92)	(-16.33)
$Log(commodity\ price)_{j,t} - Log(commodity\ price)_{j,t-2}$	-0.088***	-0.103***	-0.090***	-0.107***
	(-6.02)	(-7.38)	(-5.83)	(-7.51)
$Log(exchange\ rate)_{j,t} - Log(exchange\ rate)_{j,t-2}$	0.253***	0.322***	0.264***	0.338***
	(7.98)	(6.83)	(7.99)	(6.83)
Country/Sector FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	9,107	9,020	9,107	9,020

Note: columns (1) and (2) interact corporate CDS with SOE, which is a dummy for whether the corporation has 100% ultimate state ownership, and column (2) includes country fixed effects. Columns (3) and (4) interact corporate CDS with a dummy variable *GOV*, which takes a value of one if a corporation operates in a sector that has "government dependence" value higher than 75th percentile of sectors in the country sample, and zero otherwise. Columns (1) and (3) report regression results using a one-day event window. Columns (2) and (4) report regression results using a two-day event window. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.12: Two-day Event Window Results – Size Channel

Dependent variable: $Log(sovereign\ CDS)_{ij,t} - Log(sovereign\ CDS)_{ij,t-2}$

	Total Assets		Total Liabilities		Taxation	
	one-day window	two-day window	one-day window	two-day window	one-day window	two-day window
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
$Log(corporate\ CDS)_{ij,t} - Log(corporate\ CDS)_{ij,t-2}$	0.198***	0.205***	0.199***	0.209***	0.221***	0.236 ***
	(3.83)	(3.54)	(3.74)	(3.41)	(3.70)	(3.27)
$ASST_i \cdot [Log(corporate\ CDS)_{ij,t} - Log(corporate\ CDS)_{ij,t-2}]$	0.376***	0.431***				
	(6.04)	(6.80)				
$LIAB_i \cdot [Log(corporate\ CDS)_{ij,t} - Log(corporate\ CDS)_{ij,t-2}]$			0.352***	0.371***		
			(5.28)	(5.09)		
$TAX_i \cdot [Log(corporate\ CDS)_{ij,t} - Log(corporate\ CDS)_{ij,t-2}]$					0.261***	0.248***
					(3.23)	(2.89)
$Log(stock\ index)_{j,t} - Log(stock\ index)_{j,t-2}$	-0.479***	-0.516***	-0.484***	-0.527***	-0.493***	-0.538***
	(-20.23)	(-20.19)	(-19.81)	(-19.69)	(-19.13)	(-19.26)
$Log(commodity\ price)_{j,t} - Log(commodity\ price)_{j,t-2}$	-0.084***	-0.100***	-0.080***	-0.095***	-0.090***	-0.108***
	(-6.37)	(-8.07)	(-5.91)	(-7.17)	(-6.28)	(-7.95)
$Log(exchange\ rate)_{j,t} - Log(exchange\ rate)_{j,t-2}$	0.242***	0.296***	0.237***	0.297***	0.257***	0.330***
	(8.41)	(6.82)	(8.21)	(6.73)	(8.32)	(7.00)
Country FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	9,107	9,020	9,107	9,020	9,107	9,020

Note: columns (1) and (2) interact corporate CDS with *ASST*, a dummy for whether the corporation has total assets higher than 75th percentile of its country level; columns (3) and (4) interact corporate CDS with *LIAB*, a dummy for whether the corporation has total liabilities higher than 75th percentile of its country level; columns (5) and (6) interact corporate CDS with *TAX*, a dummy for whether the corporation has total taxation higher than 75th percentile of its country level. Columns (1), (3), and (5) report regression results using a one-day event window. Columns (2), (4), and (6) report regression results using a two-day event window. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.13: Two-day Event Window Results - Financial Channel

Dependent variable: $Log(sovereign\ CDS)_{ij,t} - Log(sovereign\ CDS)_{ij,t-2}$

	Bank Stress	
	one-day window	two-day window
Independent variable	(1)	(2)
$Log(corporate\ CDS)_{ij,t} - Log(corporate\ CDS)_{ij,t-2}$	0.293***	0.291***
	(4.66)	(4.46)
$BANK_{j,t-2} \cdot [Log(bank\ CDS)_{j,t} - Log(bank\ CDS)_{j,t-2}]$	0.046**	0.203***
	(2.12)	(4.37)
$Log(bank\ CDS)_{j,t} - Log(bank\ CDS)_{j,t-2}$	0.094***	0.149***
	(11.15)	(10.79)
$Log(stock\ index)_{j,t} - Log(stock\ index)_{j,t-2}$	-0.486***	-0.512***
	(-16.67)	(-16.15)
$Log(commodity\ price)_{j,t} - Log(commodity\ price)_{j,t-2}$	-0.090***	-0.108***
	(-5.98)	(-7.61)
$Log(exchange\ rate)_{j,t} - Log(exchange\ rate)_{j,t-2}$	0.255***	0.294***
	(7.81)	(6.26)
Country/Sector FE	Y	Y
Time FE	Y	Y
Observations	8,988	8,822

Note: columns (1) and (2) interact bank CDS with a dummy variable *BANK*, which takes a value of one if country *j* on date *t* experiences a news release on any of the banks included in the sample, and zero otherwise. Column (1) reports regression results using a one-day event window. Column (2) reports regression results using a two-day event window. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.14: Falsification Test Results – Fiscal Channel

	State Ownership		Gov. Dependence	
	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$
Independent variable	(1)	(2)	(3)	(4)
$\Delta Log(corporate\ CDS)_{ijt}$	0.076**	0.074**	0.098***	0.092***
	(1.96)	(1.96)	(4.52)	(4.02)
$SOE_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.083	0.070		
	(1.30)	(1.13)		
$GOV_{qj} \cdot \Delta Log(corporate\ CDS)_{iqjt}$			-0.020	-0.016
			(-0.38)	(-0.32)
$\Delta Log(stock\ index)_{jt}$	-0.070**	-0.064**	-0.070**	-0.057*
	(-2.34)	(-2.12)	(-2.33)	(-1.79)
$\Delta Log(commodity\ price)_{jt}$	0.011	0.013	0.009	0.011
	(0.71)	(0.83)	(0.59)	(0.65)
$\Delta Log(exchange\ rate)_{jt}$	0.517***	0.525***	0.518***	0.521***
	(7.31)	(7.21)	(7.31)	(6.89)
Country FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	4,680	4,680	4,680	4,680

Note: columns (1) and (2) interact corporate CDS with *SOE*, which is a dummy for whether the corporation has 100% ultimate state ownership, and column (2) includes country fixed effects. Columns (3) and (4) interact corporate CDS with a dummy variable *GOV*, which takes a value of one if a corporation operates in a sector that has "government dependence" value higher than 75th percentile of sectors in the country sample, and zero otherwise. Column (4) includes country and sector fixed effects. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.15: Falsification Test Results – Size Channel

	Total Assets		Total Liabilities		Taxation	
	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Log(corporate\ CDS)_{ijt}$	0.050	0.048	0.046	0.045	0.054	0.052
	(1.48)	(1.48)	(1.39)	(1.38)	(1.48)	(1.48)
$ASST_i \cdot \Delta Log(corporate\ CDS)_{ijt}$	0.126***	0.118***				
	(2.96)	(2.83)				
$LIAB_i \cdot \Delta Log(corporate\ CDS)_{ijt}$			0.123***	0.117***		
			(2.75)	(2.74)		
$TAX_i \cdot \Delta Log(corporate\ CDS)_{ijt}$					0.106**	0.101**
					(2.25)	(2.24)
$\Delta Log(stock\ index)_{jt}$	-0.056*	-0.051*	-0.059**	-0.054*	-0.062**	-0.057*
	(-1.93)	(-1.73)	(-2.02)	(-1.82)	(-2.13)	(-1.92)
$\Delta Log(commodity\ price)_{jt}$	0.013	0.015	0.013	0.015	0.012	0.014
	(0.87)	(0.98)	(0.88)	(1.00)	(0.78)	(0.92)
$\Delta Log(exchange\ rate)_{jt}$	0.507***	0.515***	0.507***	0.515***	0.515***	0.522***
	(7.26)	(7.16)	(7.26)	(7.17)	(7.29)	(7.19)
Country FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	4,680	4,680	4,680	4,680	4,680	4,680

Note: columns (1) and (2) interact corporate CDS with *ASST*, which is a dummy for whether the corporation has total assets higher than 75th percentile of its country level; columns (3) and (4) interact corporate CDS with *LIAB*, which is a dummy for whether the corporation has total liabilities higher than 75th percentile of its country level; columns (5) and (6) interact corporate CDS with *TAX*, which is a dummy for whether the corporation has total taxation higher than 75th percentile of its country level. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.16: Falsification Test Results - Financial Channel

Dependent variable: $\Delta Log(sovereign\ CDS)_{j,t-1}$

	Bank Stress	
	$\Delta Log(SCDS)_{j,t}$	$\Delta Log(SCDS)_{j,t-1}$
Independent variable	(1)	(2)
$\Delta Log(corporate\ CDS)_{ijt}$	0.084**	0.080**
	(2.00)	(1.99)
$BANK_{jt} \cdot \Delta Log(bank\ CDS)_{jt}$	0.083***	0.085***
	(3.37)	(3.48)
$\Delta Log(bank\ CDS)_{jt}$	0.008	0.008
	(0.80)	(0.74)
$\Delta Log(stock\ index)_{jt}$	-0.063**	-0.056*
	(-2.08)	(-1.83)
$\Delta Log(commodity\ price)_{jt}$	0.011	0.013
	(0.74)	(0.84)
$\Delta Log(exchange\ rate)_{jt}$	0.513***	0.522***
	(7.25)	(7.17)
Country/Sector FE	Y	Y
Time FE	Y	Y
Observations	4,612	4,612

Note: columns (1) and (2) interact bank CDS with a dummy variable *BANK*, which takes a value of one if country *j* on date *t* experiences a news release on any of the banks included in the sample, and zero otherwise. T statistics are reported in parentheses. Standard errors are "Newey-West" HAC standard errors. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.17: Extreme Value Analysis - Baseline Regression Results (5th-percentile Threshold, with Bank Extreme Values Excluded)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day *t*

Independent variable	(1)	(2)	(3)	(4)	(5)
Dummy for corp. CDS extreme changes	2.039*** (10.07)	2.039*** (10.09)	2.003*** (9.69)	2.002*** (9.69)	1.930*** (9.25)
Daily change in commodity price		-0.001 (-1.02)	-0.001 (-0.93)	-0.001 (-0.94)	-0.002* (-1.37)
Daily change in TED spread			0.133*** (7.17)	0.133*** (7.22)	0.094*** (5.55)
Daily change in US Repo rate				-5.879 (-1.34)	-4.527 (-1.10)
Daily change in VIX					0.193*** (10.56)
Observations	31,083	31,083	31,083	31,083	29,049

Note: standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

Table A.18: Extreme Value Analysis - Baseline Regression Results (1st-percentile Threshold, with Bank Extreme Values Excluded)

Dependent variable: a dummy=1 if the sovereign experiences an extreme change in CDS rate in day *t*

Independent variable	(1)	(2)	(3)	(4)	(5)
Dummy for corp. CDS extreme changes	3.051*** (11.37)	3.046*** (11.33)	2.984*** (10.85)	2.983*** (10.82)	2.848*** (10.75)
Daily change in commodity price		0.005*** (3.13)	0.005*** (3.02)	0.005*** (2.93)	0.005*** (3.32)
Daily change in TED spread			0.088** (2.31)	0.088** (2.39)	0.057 (1.48)
Daily change in US Repo rate				-25.13 (-1.25)	-24.11 (-1.24)
Daily change in VIX					0.183*** (9.08)
Observations	33,858	33,858	33,858	33,858	33,858

Note: standard error clustered at the country level and z statistics reported in parentheses. *, ** and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

B Appendix for Chapter 2

Table B.1: Timeline of Selective Major Events during the Global Financial Crisis

Date	**Event**
February 27, 2007	Freddie Mac announces that it will no longer buy the riskiest subprime mortgages and mortgage-related securities.
April 2, 2007	New Century Financial Corporation, a leading subprime mortgage lender, files for Chapter 11 bankruptcy protection.
August 9, 2007	BNP Paribas, France's largest bank, halts redemptions on three investment funds.
August 10, 2007	The Federal Reserve Board announces that it "will provide reserves as necessary...to promote trading in the federal funds market at rates close to the FOMC's target rate of 5.25 percent."
December 12, 2007	The Federal Reserve Board and other central banks announce measures designed to address elevated pressures in short-term funding markets.
February 13, 2008	President Bush signs the Economic Stimulus Act of 2008 into law.
July 30, 2008	President Bush signs into law the Housing and Economic Recovery Act of 2008.
September 7, 2008	The Federal Housing Finance Agency (FHFA) places Fannie Mae and Freddie Mac in government conservatorship.
September 15, 2008	Lehman Brothers files for Chapter 11 bankruptcy protection. Bank of America announces its intent to purchase Merrill Lynch for $50 billion.
October 3, 2008	Congress passes and President Bush signs into law the Emergency Economic Stabilization Act of 2008, which establishes the $700 billion Troubled Asset Relief Program (TARP).
December 1, 2008	The Business Cycle Dating Committee of the National Bureau of Economic Research announces that a peak in U.S. economic activity occurred in December 2007 and that the economy has since been in a recession.
December 16, 2008	The FOMC votes to establish a target range for the effective federal funds rate of 0 to 0.25 percent.
February 17, 2009	President Obama signs into law the "American Recovery and Reinvestment Act of 2009", which includes a variety of spending measures and tax cuts intended to promote economic recovery.
March 6, 2009	The Dow Jones industrial average (DJIA) hit its lowest level of 6,443.27.
September 20, 2010	The Business Cycle Dating Committee of the National Bureau of Economic Research announces June 2009 business cycle trough/end of the last recession.

Source: Federal Reserve Bank of St. Louis' Financial Crisis Timeline and the National Bureau of Economic Research.

Table B.1: Definitions, Sources, Frequencies of Explanatory Variables

Variable	Frequency	Source	Definition
Local Stock Market Return	Daily	Bloomberg	Percentage changes in the adjusted close price of the country's major stock market index
Exchange Rate	Daily	Bloomberg	Percentage changes in the units of the local currency per U.S. dollar
Foreign Currency Reserve	Monthly	IMF	Percentage changes in the dollar value of the country's holdings of foreign reserves
U.S. Stock Market Excess Return	Daily	WRDS	Changes in value-weighted return on all NYSE, AMEX, and NASDAQ stocks minus the one-month Treasury-bill return
Treasury Yields	Daily	WRDS	Changes in the five-year constant maturity Treasury (CMT) rates
U.S. Yield Curve Slope	Daily	WRDS	Changes in the difference between the 10-year Treasury bond rate and the 3-month Treasury bill rate
MOVE Volatility Index	Daily	Bloomberg	Changes in the MOVE index, a yield-curve-weighted index of the normalized implied volatility on 1-month Treasury options and is expected to capture risk preferences in fixed income markets
Investment-grade Spread	Daily	FRED	Changes in the basis-point yield spread between BBB and AAA industrial bond indexes
High-yield Spread	Daily	FRED	Changes in the basis-point yield spread between BB and BBB industrial bond indexes
Equity Premium	Daily	Bloomberg	Changes in the price-earnings ratio for the S&P 100 index
Volatility Premium	Daily	CBOE, Bloomberg	Changes in the difference between the VIX index and Garman-Klass measure of realized volatility for the S&P 100 index
Term Premium	Daily	CRSP	Changes in the expected excess returns on five-year Treasury bonds, represented as a linear function of one- through five-year forward rates. The estimated parameters used in the calculation are from Table 1 in Cochrane and Piazzesi (2005).
Global Equity Flows	Monthly	Investment Company Institute	Changes in the net new flows (inflow minus outflow) into mutual funds investing primarily in equity, in millions USD
Global Bond Flows	Monthly	Investment Company Institute	Changes in the net new flows (inflow minus outflow) into mutual funds investing primarily in bonds, in millions USD
Global Sovereign CDS Rate	Daily	Markit	Changes in the average of CDS rates for all of the countries outside that country's region
Reginal Sovereign CDS Rate	Daily	Markit	Changes in the average of CDS rates for all of the other countries in that country's region

Table B.2: Correlation Matrix of Sovereign CDS Rate Changes

	Brazil	Chile	China	Czech Republic	Egypt	Indonesia	Korea	Malaysia	Mexico
Brazil	1.00								
Chile	0.65	1.00							
China	0.34	0.41	1.00						
Czech Republic	0.34	0.45	0.42	1.00					
Egypt	0.17	0.19	0.28	0.29	1.00				
Indonesia	0.36	0.39	0.75	0.39	0.26	1.00			
Korea	0.36	0.41	0.84	0.49	0.30	0.76	1.00		
Malaysia	0.36	0.42	0.84	0.42	0.27	0.77	0.83	1.00	
Mexico	0.80	0.77	0.39	0.46	0.18	0.38	0.40	0.41	1.00
Pakistan	0.07	0.06	0.09	0.08	0.05	0.12	0.09	0.09	0.06
Peru	0.79	0.68	0.38	0.41	0.18	0.40	0.40	0.39	0.84
Philippines	0.38	0.37	0.73	0.42	0.23	0.81	0.77	0.73	0.41
Qatar	0.33	0.39	0.43	0.45	0.30	0.43	0.46	0.45	0.36
Russia	0.56	0.57	0.50	0.54	0.27	0.48	0.52	0.52	0.60
South Africa	0.55	0.60	0.52	0.57	0.26	0.53	0.53	0.55	0.62
Thailand	0.33	0.38	0.82	0.41	0.26	0.75	0.84	0.85	0.37
Turkey	0.65	0.56	0.46	0.52	0.23	0.51	0.49	0.50	0.66

Table B.3: Correlation Matrix of Sovereign CDS Rate Changes *(Continued)*

	Pakistan	Peru	Philippines	Qatar	Russia	South Africa	Thailand	Turkey
Brazil								
Chile								
China								
Czech Republic								
Egypt								
Indonesia								
Korea								
Malaysia								
Mexico								
Pakistan	1.0							
Peru	0.08	1.0						
Philippines	0.09	0.43	1.0					
Qatar	0.09	0.34	0.41	1.0				
Russia	0.08	0.57	0.49	0.48	1.0			
South Africa	0.07	0.57	0.51	0.50	0.75	1.0		
Thailand	0.09	0.37	0.74	0.43	0.49	0.51	1.0	
Turkey	0.08	0.65	0.55	0.42	0.73	0.75	0.47	1.0

Table B.3: Correlation Matrix of Local Stock Market Returns

	Brazil	Chile	China	Czech Republic	Egypt	Indonesia	Korea	Malaysia	Mexico
Brazil	1.00								
Chile	0.99	1.00							
China	0.16	0.18	1.00						
Czech Republic	0.42	0.41	0.17	1.00					
Egypt	0.15	0.15	0.12	0.20	1.00				
Indonesia	0.29	0.30	0.23	0.40	0.23	1.00			
Korea	0.28	0.29	0.28	0.42	0.19	0.52	1.00		
Malaysia	0.27	0.29	0.23	0.36	0.21	0.53	0.48	1.00	
Mexico	0.56	0.54	0.13	0.39	0.13	0.22	0.28	0.20	1.00
Pakistan	0.05	0.06	0.07	0.07	0.11	0.14	0.10	0.13	0.04
Peru	0.45	0.45	0.18	0.43	0.14	0.30	0.28	0.26	0.43
Philippines	0.21	0.23	0.19	0.32	0.20	0.42	0.42	0.46	0.13
Qatar	0.08	0.09	0.13	0.17	0.24	0.20	0.20	0.20	0.04
Russia	0.34	0.34	0.11	0.56	0.13	0.35	0.35	0.27	0.37
South Africa	0.44	0.44	0.16	0.58	0.15	0.40	0.40	0.34	0.44
Thailand	0.28	0.28	0.19	0.36	0.19	0.47	0.43	0.43	0.26
Turkey	0.38	0.38	0.12	0.52	0.15	0.33	0.34	0.27	0.38

Table B.4: Correlation Matrix of Local Stock Market Returns *(Continued)*

	Pakistan	Peru	Philippines	Qatar	Russia	South Africa	Thailand	Turkey
Brazil								
Chile								
China								
Czech Republic								
Egypt								
Indonesia								
Korea								
Malaysia								
Mexico								
Pakistan	1.0							
Peru	0.08	1.0						
Philippines	0.12	0.22	1.0					
Qatar	0.06	0.12	0.16	1.0				
Russia	0.01	0.39	0.20	0.14	1.0			
South Africa	0.07	0.44	0.27	0.13	0.56	1.0		
Thailand	0.12	0.28	0.31	0.17	0.29	0.32	1.0	
Turkey	0.07	0.33	0.26	0.11	0.47	0.45	0.31	1.0

Bibliography

Acemoglu, D., Ozdaglar, A., and Tahbaz-Salehi, A. (2017). Microeconomic origins of macroeconomic tail risks. *American Economic Review*, 107(1):54-108.

Acharya, V., Drechsler, I., and Schnabl, P. (2014). A pyrrhic victory? Bank bailouts and sovereign credit risk. *The Journal of Finance*, 69(6):2689-2739.

Acharya, V. and Johnson, T. C. (2007). Insider trading in credit derivatives. *Journal of Financial Economics*, 84(1):110-141.

Aggarwal, R. and Rivoli, P. (1989). Seasonal and day-of-the-week effects in four emerging stock markets. *Financial Review*, 24(4):541-550.

Aizenman, J., Hutchison, M., and Jinjarak, Y. (2013). What is the risk of European sovereign debt defaults? Fiscal space, CDS spreads and market pricing of risk. *Journal of International Money and Finance*, 34:37-59.

Arellano, C., Bai, Y., and Bocola, L. (2019). Sovereign default risk and firm heterogeneity.

Arteta, C., & Hale, G. (2008). Sovereign debt crises and credit to the private sector. *Journal of international Economics*, 74(1), 53-69.

Augustin, P., Boustanifar, H., Breckenfelder, J., and Schnitzler, J. (2018). Sovereign to corporate risk spillovers. *Journal of Money, Credit and Banking*, 50(5):857-891.

Basher, S. A. and Sadorsky, P. (2006). Day-of-the-week effects in emerging stock markets. *Applied Economics Letters*, 13(10):621-628.

Baskaya, Y. S. and Kalemli- Özcan, Ş. (2016). Sovereign risk and bank lending: Evidence from 1999 Turkish earthquake. Technical report, National Bureau of Economic Research.

Baxter, M. and Kouparitsas, M. A. (2005). Determinants of business cycle co-movement: A robust analysis. *Journal of Monetary Economics*, 52(1):113-157.

Bedendo, M. and Colla, P. (2015). Sovereign and corporate credit risk: Evidence from the Eurozone. Journal of Corporate Finance, 33:34-52.

Bernard, V. L. and Thomas, J. K. (1989). Post-earnings-announcement drift: Delayed price response or risk premium? *Journal of Accounting Research*, 27:1-36.

Berndt, A. and Obreja, I. (2010). Decomposing European CDS returns. *Review of Finance*, 14(2):189-233.

Bocola, L. (2016). The pass-through of sovereign risk. *Journal of Political Economy*, 124(4):879-926.

Carvalho, V. M. and Grassi, B. (2019). Large firm dynamics and the business cycle. *American Economic Review*, 109(4):1375-1425.

Cochrane, J. H. and Piazzesi, M. (2005). Bond risk premia. *American Economic Review*, 95(1):138-160.

Corsetti, G., Kuester, K., Meier, A., and Müller, G. J. (2013). Sovereign risk, fiscal policy, and macroeconomic stability. *The Economic Journal*, 123(566): F99-F132.

Dieckmann, S. and Plank, T. (2012). Default risk of advanced economies: An empirical analysis of credit default swaps during the financial crisis. *Review of Finance*, 16(4):903-934.

Dooley, M. and Hutchison, M. (2009). Transmission of the US subprime crisis to emerging markets: Evidence on the decoupling–recoupling hypothesis. *Journal of International Money and Finance*, 28(8):1331-1349.

Du, W. and Schreger, J. (2017). Sovereign risk, currency risk, and corporate balance sheets.

Fabozzi, F. J., Giacometti, R., and Tsuchida, N. (2016). Factor decomposition of the Eurozone sovereign CDS spreads. *Journal of International Money and Finance*, 65:1-23.

Faccio, M., Masulis, R. W., and McConnell, J. (2006). Political connections and corporate bailouts. *The Journal of Finance*, 61(6):2597-2635.

Felices, G. and Wieladek, T. (2012). Are emerging market indicators of vulnerability to financial crises decoupling from global factors? *Journal of Banking & Finance*, 36(2):321-331.

Fender, I., Hayo, B., and Neuenkirch, M. (2012). Daily pricing of emerging market sovereign CDS before and during the global financial crisis. *Journal of Banking & Finance*, 36(10):2786-2794.

Fields, M. J. (1931). Stock prices: A problem in verification. *The Journal of Business of the University of Chicago*, 4(4):415-418.

Forbes, K. (2013). The "Big C": Identifying and mitigating contagion. In *Proceedings-Economic Policy Symposium-Jackson Hole*.

Gabaix, X. (2011). The granular origins of aggregate fluctuations. *Econometrica*, 79(3):733-772.

Gibbons, M. R. and Hess, P. (1981). Day of the week effects and asset returns. *Journal of Business*, pages 579-596.

Gürkaynak, R. S., Sack, B., and Swanson, E. T. (2005). Do actions speak louder than words? The response of asset prices to monetary policy actions and statements. *International Journal of Central Banking*, 1(1).

Hébert, B. and Schreger, J. (2017). The costs of sovereign default: Evidence from Argentina. *American Economic Review*, 107(10):3119-45.

Hernandez, J. (2017). How international reserves reduce the probability of debt crises. Manuscript, University of Pennsylvania.

IMF (2015). Global Financial Stability Report October 2015: Vulnerabilities, Legacies, and Policy Challenges: Risks Rotating to Emerging Markets. Technical report, International Monetary Fund.

Jeske, K., Krueger, D., and Mitman, K. (2011). Housing and the macroeconomy: The role of bailout guarantees for government sponsored enterprises. Technical report, National Bureau of Economic Research.

Jin, S., Wang, W., and Zhang, Z. (2018). The value and real effects of implicit government guarantees. *Available at SSRN 2916456*.

Jorion, P. and Zhang, G. (2007). Good and bad credit contagion: Evidence from credit default swaps. *Journal of Financial Economics*, 84(3):860-883.

Korinek, A., Roitman, A., and Végh, C. A. (2010). Decoupling and recoupling. *American Economic Review*, 100(2):393-97.

Kose, M. A., Prasad, E., Rogoff, K., and Wei, S.-J. (2009). Financial globalization: A reappraisal. *IMF Staff Papers*, 56(1):8-62.

Kose, M. A., Prasad, E. S., and Terrones, M. E. (2003). How does globalization affect the synchronization of business cycles? *American Economic Review*, 93(2):57-62.

Kwak, J. H. (2019). The granular origins of sovereign default. Technical report, University of Maryland, College Park.

Levine, R. (2002). Bank-based or market-based financial systems: Which is better? *Journal of Financial Intermediation*, 11(4):398-428.

Lin, J. Y., Cai, F., and Li, Z. (1998). Competition, policy burdens, and state-owned enterprise reform. *American Economic Review*, 88(2):422-427.

Longstaff, F. A., Pan, J., Pedersen, L. H., and Singleton, K. J. (2011). How sovereign is sovereign credit risk? *American Economic Journal: Macroeconomics*, 3(2):75-103.

Mendoza, E. G., & Yue, V. Z. (2012). A general equilibrium model of sovereign default and business cycles. *The Quarterly Journal of Economics*, 127(2), 889-946.

Neumeyer, P. A. and Perri, F. (2005). Business cycles in emerging economies: the role of interest rates. *Journal of Monetary Economics*, 52(2):345-380.

Newey, W. K. and West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica: Journal of the Econometric Society*, pages 703-708.

Pellegrino, B. and Zingales, L. (2017). Diagnosing the Italian disease. Technical report, National Bureau of Economic Research.

Raddatz, C. and Schmukler, S. L. (2012). On the international transmission of shocks: Micro-evidence from mutual fund portfolios. *Journal of International Economics*, 88(2):357-374.

Reinhart, C. M. and Rogoff, K. S. (2011). The forgotten history of domestic debt. *The Economic Journal*, 121(552):319-350.

Schneider, P., Sögner, L., and Veža, T. (2010). The economic role of jumps and recovery rates in the market for corporate default risk. *Journal of Financial and Quantitative Analysis*, 45(6):1517-1547.

Tomz, M. and Wright, M. L. (2007). Do countries default in "bad times"? *Journal of the European Economic Association*, 5(2-3):352-360.
Uribe, M. and Yue, V. Z. (2006). Country spreads and emerging countries: Who drives whom? *Journal of International Economics*, 69(1):6-36.

Yeyati, E. L. and Williams, T. (2012). Emerging economies in the 2000s: Real decoupling and financial recoupling. *Journal of International Money and Finance*, 31(8):2102-2126.

Zhang, B. Y., Zhou, H., and Zhu, H. (2009). Explaining credit default swap spreads with the equity volatility and jump risks of individual firms. *Review of Financial Studies*, 22(12):5099-5131.